

U.S. DEPARTMENT OF COMMERCE
National Technical Information Service

PB-260 975

Air Pollution Abstracts
Volume 6, Number 10
October 1975. 51175-52042

Environmental Protection Agency, Research Triangle Park, N C

Oct 75

TECHNICAL REPORT DATA

(Please read Instructions on the reverse before completing)

1. REPORT NO. APABCA-6-10-1975		2.		3. RECIPIENT'S ACCESSION NO.	
4. TITLE AND SUBTITLE Air Pollution Abstracts Volume 6, No. 10				5. REPORT DATE October 1975	
				6. PERFORMING ORGANIZATION CODE	
7. AUTHOR(S)				8. PERFORMING ORGANIZATION REPORT NO.	
9. PERFORMING ORGANIZATION NAME AND ADDRESS Air Pollution Technical Information Center Research Triangle Park, North Carolina 27711				10. PROGRAM ELEMENT NO.	
				11. CONTRACT/GRANT NO.	
12. SPONSORING AGENCY NAME AND ADDRESS Same				13. TYPE OF REPORT AND PERIOD COVERED	
				14. SPONSORING AGENCY CODE	
15. SUPPLEMENTARY NOTES					
16. ABSTRACT This periodical is published to inform air pollution personnel of the Environmental Protection Agency (EPA), and others, of technical literature recently accessioned by the Air Pollution Technical Information Center (APTIC). For each accession, its Abstract Number, APTIC accession number, bibliographic citation, and abstract are given. Translations are cited with their sources whenever possible. The subject fields are as follow: Emission Sources; Control Methods; Measurement Methods; Air Quality Measurements; Atmospheric Interactions; Basic Science and Technology; Effects-Human Health; Effects-Plants and Livestock; Effects-Materials; Economic Aspects; Standards and Criteria; Legal and Administrative; Social Aspects; and General and Miscellaneous. All abstracts are listed under one of the above subject fields. A subject and author index are included. This issue contains abstracts 51175 - 52042.					
17. KEY WORDS AND DOCUMENT ANALYSIS					
a. DESCRIPTORS		b. IDENTIFIERS/OPEN ENDED TERMS		c. COSATI Field/Group	
Air pollution Abstracts Information retrieval				13B 5B	
18. DISTRIBUTION STATEMENT Unlimited		19. SECURITY CLASS (This Report)		21. NO. OF PAGES 189	
		20. SECURITY CLASS (This page)		22. PRICE \$7.50	

344038

PB 260 975

Volume 6, No. 10
October 1975
CODEN:APABCA 6(10)1975
ISSN:0027-5956

AIR POLLUTION ABSTRACTS

51175-52042



OCTOBER 1975

REPRODUCED BY
NATIONAL TECHNICAL
INFORMATION SERVICE
U. S. DEPARTMENT OF COMMERCE
SPRINGFIELD, VA. 22161

U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Air Quality Planning and Standards
Research Triangle Park, N. C. 27711

AIR POLLUTION ABSTRACTS

VOLUME 6, NO. 10

OCTOBER 1975

Prepared by
Air Pollution Technical Information Center (APTIC)
Research Triangle Park, North Carolina 27711

Subscribers receiving 'Air Pollution Abstracts'
directly from the U. S. Government Printing Office
should address any inquiries regarding issues
subsequent to June 1972 to:
U. S. Government Printing Office, Washington, D., C. 20402

The Administrator of the Environmental Protection Agency has determined that the publication of this periodical is necessary in the transaction of public business required by law of this Agency. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through March 31, 1975.

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Personal authors are arranged alphabetically. The names are presented last name first. When the author is a primary author, an asterisk precedes the Abstract Number.	

INTRODUCTION

This periodical is intended to inform personnel of the Environmental Protection Agency (EPA), and others who are also professionally interested in air pollution, of selected technical literature recently accessioned by the Air Pollution Technical Information Center (APTIC). For each accession, its Abstract Number, APTIC accession number, bibliographic citation, and abstract are given. Semiannual cumulative indexes to both subject and author are also sent to all recipients of this monthly publication.

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For non-EPA readers, APTIC can provide copies of only those articles that have been written by EPA's air pollution personnel and have not been published in the open literature. Requests for all other articles should be directed to local libraries, publishers, or authors, with the following exception. Copies of EPA's numbered air pollution technical publications, as indicated in the citation, will be provided, while supplies permit, only to certain qualified requesters, e.g., its current contractors, grantees, and air pollution control agencies; a list of these publications is available. When requesting any publications, please include the complete citation. Translations are cited with their sources whenever possible. If a translation proves to be unavailable from the source cited, or if a translation is cited without a source, it may be located through APTIC or through the National Translations Center, 35 West 33rd Street, Chicago, Illinois 60616. In order to promote scientific and technical progress by facilitating access to each of the abstracted documents, APTIC is assuring that they are also held at EPA Headquarters and at each of the EPA Regional Offices. Information regarding their accessibility may be sought from the libraries there. Their addresses are:

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The serial publications (journals, periodicals, etc.) being scanned number approximately 7,000. A list of approximately 1,000 of the most productive publications with the address of each publisher is available upon request.

As another service, abstracts of all of the literature in APTIC (not just in a single issue of this periodical) on any subject related to air pollution will be provided free of charge upon request. APTIC can search information more recent than that in the current issue of this periodical because of the lapse of time entailed by editorial, make-up, and printing work. More than 1400 subject index terms are available for such searching ---more than those included in the subject index in each issue.

Acknowledgement is given to the Technical Publications Branch, Informational Services Division, Office of Administration, Research Triangle Park, N.C. for the make-up of the cover and for arrangement of printing and distribution.

Feedback from our users, including suggestions of articles, are always welcome.

APTIC Publications

- Air Pollution Aspects of Emission Sources: Primary Lead Production - A Bibliography with Abstracts*, June 1973, GPO No. EP 4.9:126, \$0.65.
- Air pollution Aspects of Emission Sources: Primary Copper Production - A Bibliography with Abstracts*, June 1973 GPO No. EP 4.9:125, \$0.70.
- Air Pollution Aspects of Emission Sources: Pulp and Paper Industry - A Bibliography with Abstracts*, March 1973, GPO No. EP 4.9:121, \$2.35.
- Air Pollution Aspects of Emission Sources: Primary Aluminum Production - A Bibliography with Abstracts*, June 1973, GPO No. EP 4.9:119, \$0.90.
- Mercury and Air Pollution: A Bibliography with Abstracts*, October 1972, GPO No. EP 4.9:114, \$1.25.
- Odors and Air Pollution: A Bibliography with Abstracts*, October 1972, GPO No. EP 4.9:113, \$3.00.
- Air Pollution Aspects of Emission Sources: Petroleum Refineries - A Bibliography With Abstracts*, July 1972, GPO No. EP 4.9:110, \$1.25.
- Air Pollution Aspects of Emission Sources: Iron and Steel Mills - A Bibliography With Abstracts*, May 1972, GPO No. EP 4.9:107, \$1.00.
- Air Pollution Aspects of Emission Sources: Boilers - A Bibliography With Abstracts*, May 1972, GPO No. EP 4.9:105, \$2.00.
- Hydrochloric Acid and Air Pollution: An Annotated Bibliography*, July 1971, GPO No. EP 4.9:100, \$0.55.
- Chlorine and Air Pollution: An Annotated Bibliography*, July 1971, GPO No. EP 4.9:99, \$0.55.
- Air Pollution Aspects of Emission Sources: Electric Power Production - A Bibliography With Abstracts*, May 1971, GPO No. EP 4.9:96, \$2.25.
- Air Pollution Aspects of Emission Sources: Cement Manufacturing - A Bibliography With Abstracts*, May 1971, GPO No. EP 4.9:95, \$0.50.
- Air Pollution Aspects of Emission Sources: Sulfuric Acid Manufacturing - A Bibliography With Abstracts*, May 1971, GPO No. EP 4.9:94, \$0.65.
- Air Pollution Aspects of Emission Sources: Nitric Acid Manufacturing - A Bibliography With Abstracts*, May 1971, GPO No. EP 4.9:93, \$0.45.
- Air Pollution Aspects of Emission Sources: Municipal Incineration - A Bibliography With Abstracts*, May 1971, GPO No. EP 4.9:92, \$1.00.
- Photochemical Oxidants and Air Pollution: An Annotated Bibliography (2 Volumes)*, March 1971, GPO No. EP 4.9:88, \$6.25.
- Beryllium and Air Pollution: An Annotated Bibliography*, February 1971, GPO No. EP 4.9:83, \$0.40.
- Asbestos and Air Pollution: An Annotated Bibliography*, February 1971, GPO No. EP 4.9:82, \$0.50.
- Municipal Incineration: A Review of Literature*, June 1971, GPO No. EP 4.9:79, \$1.00.
- Hydrocarbons and Air Pollution: An Annotated Bibliography (2 Volumes)*, October 1970, GPO No. HE 20.1309:75, \$5.00.

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RECENT CONTRACT AWARDS

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Durham Contract Operations Contracts Management Division, EPA

- Contract No. 68-02-2072, RFP No. Du-75-C176** **\$35,700**
PROVIDE A REFERENCE MANUAL GIVING COST DATA TO APPROXIMATE
CAPITAL AND OPERATING COSTS OF SELECTED AIR POLLUTION CONTROL
SYSTEMS.
General American Transportation Corp., General American Research Division, 7449 North
Natchez Avenue, Niles, Illinois 60648
- Contract No. 68-02-1319, Modification No. 25** **\$1,370,699**
NONPERSONAL ENGINEERING AND TECHNICAL SERVICES.
Radian Corp., 8500 Shoal Creek Boulevard, Austin, Texas 78766
- Contract No. 68-02-2232, RFP No. Du-75-B069** **\$351,000**
CALIFORNIA CONSUMER-OWNED CATALYST-EQUIPPED VEHICLE EMISSIONS
STUDY.
Olson Laboratories, Inc., 421 E. Cerritos Avenue, Anaheim, California 92805
- Contract No. 68-02-2086, RFP No. Du-75-C389** **\$59,727**
INSTALL A CABLE TRAY AT THE NATIONAL ENVIRONMENTAL RESEARCH
CENTER, RESEARCH TRIANGLE PARK, NORTH CAROLINA 27711.
AAA Electric Company, Inc., 1209 Athens Drive, Raleigh, North Carolina 27606
- Contract No. 68-02-1766, Modification No. 2** **\$41,568**
ANALYSIS OF LOS ANGELES CATALYST STUDY PARTICULATE SAMPLES FOR
TSP, SO₄, NO₃, AND Pb AND GASEOUS SAMPLES FOR SO₂.
Rockwell International Corp., 1049 Camino Dos Rios, P. O. Box 1085, Thousand Oaks,
California 91360
- Contract No. 68-02-1719, Modification No. 2** **\$37,373**
EFFECT OF HYDROCARBON COMPOSITION CHANGES (AS A RESULT OF CON-
TROL) UPON THE OXIDANT-HC RELATIONSHIPS.
Exxon Research and Engineering Company, P. O. Box 8, Linden, New Jersey 07036
- Contract No. 68-02-2244, RFP No. Du-75-B071** **\$79,824**
EFFECTS OF ACUTE LOW LEVEL CARBON MONOXIDE EXPOSURE ON EXERCISE
PERFORMANCE AND CARDIAC FUNCTION IN HEALTHY ADULTS ACCLI-
MATED TO RESIDENCE IN HIGHER ALTITUDES.
National Asthma Center, Children's Asthma Research Institute and Hospital, 1999 Julian
Street, Denver, Colorado 80204

Contract No. 68-02-1702, Modification No. 2..... \$56,589
SUPPLY SCREENED HUMAN SUBJECTS FOR CLINICAL STUDIES.
University of North Carolina, Office of Research Administration, South Building, Chapel Hill,
North Carolina 27514

Contract No. 68-02-2074, RFP No. Du-75-C333 \$50,400
MODIFICATION TO EXISTING FIRE PROTECTION SYSTEM AT THE NATIONAL
ENVIRONMENTAL RESEARCH CENTER, RESEARCH TRIANGLE PARK, NORTH
CAROLINA 27711.
Max Boswell Plumbing Company, Inc., Route 6, Box 466, Durham, North Carolina 27703

Contract No. 68-02-2223, RFP No. Du-75-B146 \$247,441
VIRAL CONTAMINATION RESULTING FROM LAND RECLAMATION USING
SEWAGE SLUDGE.
The Metropolitan Sanitary District of Greater Chicago, 100 East Erie Street, Chicago, Illinois
60611

Contract No. 68-02-1360, Modification No. 5..... \$140,037
DESIGN PRINCIPLES FOR THE CONTROL OF POLLUTANT EMISSIONS FROM THE
COMBUSTION OF HIGH TEMPERATURE LOW-BTU GAS.
Institute of Gas Technology, 3424 South State Street, IIT Center, Chicago, Illinois 60616

Contract No. 68-02-2119, RFP No. Du-75-A241 \$246,141
STUDY OF THE BATTELLE HYDROTHERMAL TREATMENT OF COAL PROCESS.
Battelle Memorial Institute, Columbus Laboratories, 505 King Avenue, Columbus, Ohio
43201

Contract No. 68-02-1323, Modification No. 19..... \$1,870,902
NONPERSONAL ENGINEERING AND TECHNICAL SERVICES.
Battelle Memorial Institute, 505 King Avenue, Columbus, Ohio 43201

Contract No. 68-02-2247, RFP No. Du-75-B040 \$53,770
DEVELOPMENT METHODOLOGY AND PROTOTYPE FOR ANALYSIS OF SULFURIC
ACID AEROSOLS COLLECTED FROM AMBIENT AIR.
Atlantic Research Corp., 5390 Cherokee Avenue, Alexandria, Virginia 22314

Contract No. 68-02-2222, RFP No. Du-75-B155 \$91,610
ANALYSIS AND EVALUATION OF PHOTODYNAMIC BIOASSAY DATA.
Case Western Reserve University, School of Medicine, Cleveland, Ohio 44106

Contract No. 68-02-2238, RFP No. Du-75-B101 \$30,000
FURTHER DEVELOPMENT OF AN AUTOMATED FIELD SULFURIC ACID SAM-
PLER.
Cabot Corp., Concord Road, Billerica, Massachusetts 01821

Contract No. 68-02-2073, RFP No. Du-75-C186 \$48,948
GUIDELINES FOR THE REVIEW OF THE IMPACT OF INDIRECT SOURCES OF AM-
BIENT AIR QUALITY.
Stanford Research Institute, 333 Ravenswood Avenue, Menlo Park, California 94025

Contract No. 68-02-2239, RFP No. Du-75-B088 \$186,090
A STUDY TO OBTAIN FIELD DATA ON BACKGROUND HYDROCARBON AND
MEASURE OXIDANT TRANSPORT PHENOMENA.
Washington State University, Engineering Research Division, Pullman, Washington 99163

Contract No. 68-02-2248, RFP No. Du-75-B215 \$189,049
BEHAVIORAL AND ELECTROENCEPHALOGRAPHIC RESPONSES OF SQUIRREL MONKEYS EXPOSED IN UTERO TO 2450 MHz ELECTROMAGNETIC RADIATION.
Stanford Research Institute, Menlo Park, California 94025

Contract No. 68-02-2253, RFP No. Du-75-B128 \$63,330
INTERFACING HIGH PRESSURE LIQUID CHROMATOGRAPHY WITH CHEMICAL IONIZATION MASS SPECTROMETRY.
Finnigan Corp., 845 West Maude Avenue, Sunnyvale, California 95086

Contract No. 68-02-2237, RFP No. Du-75-B178 \$109,413
CANCER MORTALITY AND PESTICIDE USAGE IN THE UNITED STATES.
University of North Carolina, Office of Research Administration, South Building, Chapel Hill, North Carolina 27514

Contract No. 68-02-2233, RFP No. Du-75-B033 \$49,072
DESIGN AND DEVELOPMENT OF AN ALARM-LEVEL MONITOR FOR SO₂ EMISSIONS FROM STATIONARY SOURCES.
International Biophysics Corp., 2700 DuPont Drive, Irvine, California 92664

Contract 68-02-2114, RFP No. Du-75-A137 \$626,756
ELECTROSTATIC PRECIPITATORS FOR CONTROL OF FINE PARTICLE EMISSIONS.
Southern Research Institute, 2000 Ninth Avenue, South, Birmingham, Alabama 35205
(NOTE: Contract contains options in the amount of \$289,165)

Contract No. 68-02-1320, Modification No. 17 \$1,577,161
NONPERSONAL ENGINEERING AND TECHNICAL SERVICES.
Monsanto Research Corp., Dayton Laboratory, Dayton, Ohio 45407

Contract No. 68-02-2257, RFP No. Du-75-B127 \$69,189
HEALTH EFFECTS ASSOCIATED WITH WASTEWATER TREATMENT AND DISPOSAL SYSTEMS.
SCS Engineers, 4014 Long Beach Boulevard, Long Beach, California 90807

Contract No. 68-02-2258, RFP No. Du-75-B172 \$62,827
SMOG CHAMBER STUDIES OF ATMOSPHERIC CHEMISTRY OF ORGANIC AND NITROGEN CONTAINING EMISSION FROM EMERGING ENERGY TECHNOLOGIES.
Research Triangle Institute, P. O. Box 12194, Research Triangle Park, North Carolina 27709

Contract No. 68-02-2120, RFP No. Du-75-A165 \$123,810
A STUDY OF FUGITIVE EMISSIONS FROM METALLURGICAL PROCESSES.
Midwest Research Institute, 425 Volker Boulevard, Kansas City, Missouri 64110

Contract No. 68-02-2088, RFP No. Du-75-C245 \$32,400
PROVIDE AND INSTALL A PUBLIC ADDRESS SYSTEM FOR THE NATIONAL ENVIRONMENTAL RESEARCH CENTER, RESEARCH TRIANGLE PARK, NORTH CAROLINA.
Mehlich Electronics, Inc., P. O. Box 33276, Raleigh, North Carolina 27606

Contract No. 68-02-1325, Modification No. 18 \$1,478,664
NONPERSONAL ENGINEERING AND TECHNICAL SERVICES.
Research Triangle Institute, P. O. Box 12194, Research Triangle Park, North Carolina 27709

Contract No. 68-02-1776, RFP No. Du-75-B141 \$2,186,581
OPERATION, MAINTENANCE, AND CALIBRATION OF CHAMPS AIR MONITORING
SYSTEM.

Rockwell International, 1049 Camino Dos Rios, Thousand Oaks, California 91360

Contract No. 68-02-2116, RFP No. Du-74-X125 \$594,933
DEVELOPMENT OF CATALYST AND SYSTEM DESIGN CRITERIA FOR CATA-
LYTIC COMBUSTORS WITH APPLICATION TO STATIONARY SOURCES.

Aerotherm Division, Acurex Corp., 485 Clyde Avenue, Mountain View, California 94042

Contract No. 68-02-2245, RFP No. Du-75-B176 \$187,251
AIRCRAFT MEASUREMENTS IN SUPPORT OF STUDIES OF SULFUR TRANSFOR-
MATION AND TRANSPORT.

Meteorology Research, Inc., P. O. Box 637, Altadena, California 91001 (NOTE: Contract contains options in the amount of \$41,521)

Contract No. 68-02-2079, RFP No. Du-75-C368 \$107,433
FEASIBILITY STUDIES AND OPTIMIZATIONS PROGRAMS NECESSARY FOR THE
ENHANCED UTILIZATION OF THE EPA AEROMETRIC AND REPORTING
SYSTEM (AEROS) DATA BASES (PRINCIPALLY NED AND SAROAD) ON THE
EPA, RESEARCH TRIANGLE PARK UNIVAC 1110 COMPUTER.

Integrated Systems Support, Inc., 7929 Westpark Drive, McLean, Virginia 22101 (NOTE: Contract contains options in the amount of \$108,100)

Contract No. 68-02-2117, RFP No. Du-75-A151 \$322,800
MODIFY AERODYNAMIC TEST CHAMBER.

Acurex Corp., Aerotherm Division, 485 Clyde Avenue, Mountain View, California 94042

Contract No. 68-02-2259, RFP No. Du-75-B093 \$84,168
DEVELOPMENT OF A CONTINUOUS 12S SOURCE MONITORING SYSTEM.

Meloy Laboratories, Inc., 6713 Electronic Drive, Springfield, Virginia 22151

Contract No. 68-02-1321, Modification No. 24 \$1,060,500
NONPERSONAL ENGINEERING AND TECHNICAL SERVICE.

PEDCo Environmental Specialists, Inc., Suite, 13, Atkinson Square, Cincinnati, Ohio 45246

Contract No. 68-02-2087, RFP No. Du-75-C397 \$47,258
DESIGN AND INSTALL AN INTRUSION AND FIRE ALARM PANEL AND REZONE
THE FIRE ALARM SYSTEM AT THE NERC, RESEARCH TRIANGLE PARK, N.
C.

Piracci Construction Company, Inc., 2552 Woodbrook Avenue, Baltimore, Maryland 21217

SUBJECT FIELDS AND SCOPE NOTES

1. EMISSION SOURCES

Information pertaining to an industry, process, or material associated with air pollution. Documents in this category are concerned primarily with characteristics of a specific class of emission sources including types, rates, industries; secondary coverage may include effects, control methods, etc.

2. CONTROL METHODS

Includes equipment and both specific source control and general abatement efforts. Included are documents describing the operating principles, design, operation, efficiency, etc., of equipment and methods of removing pollutants. The scope of the document can vary from a device for a specific source to an approach applicable to an entire industry--e.g., automobiles.

3. MEASUREMENT METHODS

Includes equipment as well as methods. Confined to development testing and evaluation of pollutant determination methods (sampling, analytical, monitoring) and equipment, as such. Data obtained by use of methods in specific applications are placed in the applicable subject categories.

4. AIR QUALITY MEASUREMENTS

Pollution measurements in the ambient air, generally related to specific geographical locations, such as area surveys. Also includes general reviews of area situations and emission source inventories.

5. ATMOSPHERIC INTERACTION

All chemical and physical phenomena occurring in the atmosphere. Included is material on dispersion, air pollution forecasts, meteorological effects, topographical effects, photochemical reactions in the atmosphere, etc. Laboratory studies of photochemical reactions are assigned to Basic Science and Technology.

6. BASIC SCIENCE AND TECHNOLOGY

General discussions or data compilations for the basic physical and chemical properties of pollutants. Theoretical and laboratory studies on related chemical and biological reactions and mechanisms. Mass transfer and other basic knowledge related to process engineering applications in emission control or abatement. Excludes photochemical studies in the atmosphere and biochemical studies related to effects of air pollution.

7. EFFECTS--HUMAN HEALTH

Covers medical and epidemiological studies; biological effects other than those on plants and livestock produced by air pollutants; laboratory animal experiments.

8. EFFECTS--PLANTS AND LIVESTOCK

Effects on vegetation--crops, trees, other plants--and on livestock as distinguished from laboratory experimental animals.

9. EFFECTS--MATERIALS

Deterioration, corrosion, etc., of physical materials, buildings, and structures.

10. ECONOMIC ASPECTS

Economic implications of air pollution and its control, e.g., economic losses from pollution damage, and costs of control programs or equipment in general.

11. STANDARDS AND CRITERIA

Recommended or adopted guides, criteria and standards for allowable emission limits or pollutant concentrations, air quality, equipment characteristics, and fuels.

12. LEGAL AND ADMINISTRATIVE

Legal aspects include legislation, ordinances, rules, litigation, hearings, decisions, etc. Administration covers administrative and miscellaneous information concerning control agencies and control and research programs. Typical topics are personnel, budgets, contractual activities and program descriptions.

13. SOCIAL ASPECTS

Sociological and psychological aspects such as social attitudes public opinion studies, public relations, and public information.

14. GENERAL AND MISCELLANEOUS

Reviews of general problems, trends and background. Documents not assignable to other categories.

ABSTRACT BULLETIN

EMISSION SOURCES

1975

51175

APITC NO. 74279

Altshuler, Samuel L.

AMBIENT AIR QUALITY IN THE VICINITY OF GEOTHERMAL POWER GENERATING PLANTS. Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 11p., 1975. 8 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-46.2.)

The emission of hydrogen sulfide (H₂S) during the utilization of geothermal steam and its effect on air quality at The Geysers in Northern California are discussed. Ambient air surveys performed at The Geysers during the last 5 yr have shown significant concentrations of H₂S within the heavily developed area of The Geysers. H₂S concentrations outside the Geysers area have remained very low. (Author abstract modified)

51176

APITC NO. 74152

Buchholz, Horst

NEW LACQUERS FOR THE ABATEMENT OR SUPPRESSION OF EMISSION FOR THIN SHEET PACKAGINGS. (Lackentwicklungen zur Verminderung oder Vermeidung von Emissionen fuer Feinstblechemballagen). Text in German. Blech, 22(4):114-117, April 1975.

New achievements and developments in lacquer production and application are surveyed with respect to the suppression or abatement of harmful emissions during the lacquering of thin sheet packagings especially in the food packaging industry. Water-diluted lacquer systems are being improved with an attempt to achieve a dilution rate of 1:4 instead of 1:1. Both water-diluted lacquers, and water-soluble lacquer and high-solids systems have been developed to minimize the use of organic solvents which may eliminate the need for afterburning. Systems dried by ultraviolet radiations are free from solvents. High-solids systems in particular make it possible to reduce the energy expenditure for the thermal afterburner and for air preheating through minimizing the waste air quantity.

51177

APITC NO. 74256

Butler, John D., Stuart D. Macmurdo, and Douglas R. Middleton

MOTOR VEHICLE GENERATED POLLUTION IN URBAN AREAS. J. Environ. Health, vol. 83:69-77, 1975. 12 refs.

Airborne particulate lead, carbon monoxide, and nitrogen oxide measurements were made in the vicinity of the Midlands motorway link in Birmingham, Great Britain. Average daytime lead concentrations of 2.2 micrograms/cu m fell to around 0.8 micrograms/cu m at a distance of 500-600 m from a monitoring site located near heavy traffic, illustrating the limited transport of such emissions. Particulate lead concentrations inside and outside a house of 160 m from heavy traffic were about the same, while the lead concentration inside a house located along the side of the motorway was about 70% of the outside value. Blood lead analyses of the occupants revealed values of 24 and 19 micrograms lead/100 ml blood. Traffic flow was also related to carbon monoxide and nitrogen oxide concentration,

with a correlation coefficient of 0.8 being obtained for each pollutant. Nitrogen oxide concentrations near a heavy traffic area varied from about 15-20 pphm; while those for carbon monoxide varied from around 2-6 ppm, depending on the time of day and the traffic flow at that time.

51178

APITC NO. 74276

Caprarotta, Gary L. and Douglas J. Orf

AN INVESTIGATION OF MOTOR VEHICLE EMISSIONS DETERIORATION THROUGH IDLE EMISSIONS TESTING. Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 10 p., 1975. 8 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-42.2.)

The time interval in which post-tune-up emissions deteriorate to pre-tune-up levels is determined. The deterioration rate was measured by determining emission levels of the vehicles at 3-month intervals for 1 yr after each vehicle had received an emission-oriented tune-up. A sample of 30 municipal, in-use vehicles was used in the study. The emission test employed a commercial, non-dispersive infrared analyzer, and consisted of two-mode, idle measurements. The test cycle consisted of preconditioning the vehicles, followed by emission measurements taken at fast idle (2500 rpm) and at normal idle (manufacturer's specifications). Mean hydrocarbon emissions in the fast idle mode reached pre-tune-up emission concentrations at time zero. Idle concentration reached pre-tune-up emissions at 4.5 mo. Carbon monoxide emissions in the fast idle mode reached pre-tune-up concentrations at 5 mo, while normal idle emissions did no in about 6 mo. A 6-month maintenance period was deemed most appropriate.

51179

APITC NO. 75165

Cavanaugh, G., C. E. Burklin, J. C. Dickerson, H. E. Lebowitz, S. S. Tam, G. R. Smithson, Jr., H. Nack, and J. H. Oxley

POTENTIALLY HAZARDOUS EMISSION FROM THE EXTRACTION AND PROCESSING OF COAL AND OIL (FINAL REPORT). Radian Corp. and Battelle Memorial Inst., Ohio, Columbus Labs., Environmental Protection Agency Contract 68-02-1323, Task 30, Program Element 1AB015, ROAP 21AFH-025, Rept. EPA-650/2-75-038, 161p., April 1975. 36 refs.

NTIS: PB 241803/AS

Potentially hazardous classes of compounds associated with emissions from oil refining, coking, coal gasification (Lurgi process), and solvent refining are identified. Hazardous compounds associated with oil refining include: acids, anhydrides, alcohols, amines, carbonyl compounds, ethers, hydrocarbons, lactones, nitrosoamines, phenols, sulfur compounds, trace metals, organometallics, fine particulates, and cyanides. Those associated with air emissions from coking operations include: acids anhydrides, carbonyls, hydrocarbons, phenols, sulfur compounds, trace metals, organometallics, cyanides, and particulates. Potentially hazardous classes of compounds associated with gasification processes include alcohols, amines, carbonyls, hydrocarbons, phenols, sulfur compounds, trace metals, organometallics, and particulates. The environmental impact of solvent refining is not well defined; however, liquefaction products are probably more hazardous than crude oil products. Available documents do not appear adequate for the accurate listing of potentially hazardous emissions from the above processes.

51180

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APTIC NO. 73856

Dabberdt, Walter F. and Richard C. Sandys

ASSESSMENT OF THE AIR QUALITY IMPACT OF INDIRECT SOURCES. Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 44p., 1975. 26 refs. (Presented at the Specialty Conference on Long Term Maintenance of Clean Air Standards, Chicago, Ill., Feb. 3-4, 1975.)

An assessment of the air quality impact of indirect sources is considered, with particular reference to traffic factors and land use patterns. The methodology used incorporates a three-stage simulation technique. Demographic and roadway network input data in a dynamic highway transportation model are used to predict hourly travel times, vehicles volumes, and travel times along individual roadway links. These data provide input to a multimodal vehicle emissions model that generates pollutant emissions model that generates pollutant emissions on each link; these emissions are in turn used in an atmospheric dispersion model to predict pollutant concentrations both regionwide and in the immediate vicinity of individual facilities. Air quality impacts are evaluated for three alternative strategies for the development of retail shopping facilities: a single regional shopping center, three community shopping centers, and 10 neighborhood centers and strip-type developments. The model projects that 1980 regionwide carbon monoxide concentrations are generally comparable to 1973 concentrations despite an increase in vehicle travel time primarily due to the impact of emission control devices. Network improvements aid in minimizing both congestion and CO levels. The regionwide frequency distribution of CO concentrations is insensitive to the distribution of shopping facilities for the three 1980 developmental alternatives. The CO flux density is relatively independent of facility size, and the maximum microscale adverse air quality impact potential is apparently associated with smaller facilities. Vehicle operating time appears to be a better indicator of emission changes than vehicle miles travelled, the latter being indirectly proportional to changes in CO, nitrogen oxides, and hydrocarbons. (Author summary modified)

51181

APTIC NO. 74154

Descroix, P.

EFFECT OF AIR POLLUTION ON WATER POLLUTION IN FRANCE. (*L'influence de la pollution atmosphérique sur la pollution de l'eau en France*). Text in French. Tech. Sci. Munic. Rev. Eau, 70(3):127-129, March 1975. 4 refs.

Studies and measurements on water pollution caused by air pollution in France are reviewed. Systematic precipitation pH measurements in and around Paris show an increasing acidification of the precipitation during the last years. However, the acid precipitation is readily neutralized in the sewer system and in the rivers. Vanadium, present in coal and petroleum products, is emitted into the air in detectable quantities, but it is readily and rapidly eliminated from water by spontaneous precipitation and flocculation. Wastewater from flue gas scrubbers in phosphoric acid and superphosphate production plants can be contaminated by large concentrations of fluorine, which represents water contamination hazards.

51182

APTIC NO. 73808

Doi, Kan

ENVIRONMENT AND POLLUTION WITH INDUSTRIALIZATION. (*Kogyoka to kankyo, kagai*). Text in Japanese. Toshi Mondai (J. Tokyo Inst. Munic. Res.), 66(3):43-64, March 1975. 25 refs.

For the restoration and development of industries on the ruins of war, 15 new industrial city and six special industrial development areas were appointed, and their development typified the phenomenal industrial growth of Japan. At the same time, the industrialization, intended for the improvement of social welfare, brought complex pollution problems and adverse results. The cases of two new industrial areas, Tokushima and Akita, are reviewed. The industrial develop-

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ment project and environmental pollution control measures taken are described. The relationship between the industrial development process and environmental pollution problems are discussed with reference to data on concentrations of sulfur oxide (0.015-0.034 ppm in Tokushima and 0.005-0.024 ppm in Akita), suspended particulates (0.047-0.10 mg/cu m in Tokushima), and hydrogen sulfide (0.007-0.020 ppm in Tokushima) measured during the period of 1969 to 1973 and data on water pollution.

51183

APTIC NO. 73891

Fukuma, Yuichi

AUTOMOBILE DIESEL ENGINES. (*Jidoshayo dizeru kikan*). Text in Japanese. Nainen Kikan (Internal Combust. Engine), 14(2):23-27, Feb. 1975.

Automobile diesel engines of 1974 are described. New emission standards based on the 6-mode method were issued on May 20, 1974. The carbon monoxide and hydrocarbon standards were 980 ppm and 670 ppm, respectively. The nitrogen oxide standard for the direct injection type was 1000 ppm and that for the pre-combustion type was 590 ppm. From Jan. 1, 1975, used automobiles with diesel engines would also be subject to the control. New diesel engines were developed by 4 major manufacturers aiming at reducing pollution and improving performance. The Mitsubishi 6D10 and 6D11 pre-combustion engines with a maximum output of 145 PS/3200 rpm and 155 PS/2800 rpm have a total emission of 5.974 l and 6.754 l, respectively. The Hino EH 300 pre-combustion engine with a maximum output of 155 PS/3200 rpm has a total emission of 6.211 l. The Isuzu 10 PA1 direct injection engine with a maximum output of 295 PS/2800 rpm has a total emission of 12.464 l, while Toyo Kogyo ZC swirl type engine with a maximum output of 145 PS/1600 rpm has a total emission of 5.494 l.

51184

APTIC NO. 74074

Furuhama, Shoichi

HYDROCARBON FORMATION AND ITS CONTROL. (*HC seisei to sono taisaku*). Text in Japanese. Nainen Kikan (Internal Combust. Engine), 14(2):16-22, 1975. (Special Issue.)

Unburned hydrocarbons from pre-mix engines result from combustion with insufficient air and at low temperature. Test results showed that at a speed of 50 km/hr, the hydrocarbon concentration was the lowest at an air/fuel ratio of 17-18. The concentration increased significantly at air/fuel ratios higher than 19 and 4-10% exhaust gas recirculation; the hydrocarbon concentration increased even more significantly at high air/fuel ratio. Hydrocarbon concentration also increased with increasing compression ratio because of the increase of the quench zone and lower exhaust temperature. Hydrocarbons from diesel engines result from evaporation at cold cylinder surfaces and local misfire at low load. Exhaust from a direct-injection type diesel engine had higher hydrocarbon concentration than that from a precombustion type. White smoke from diesel engines could be prevented by using fuel of high volatility and combustibility.

51185

APTIC NO. 75384

Gunderson, J. A.

FTP/SHORT CYCLE CORRELATION TESTING FOR 207 (B) IMPLEMENTATION - CATALYST EQUIPPED VEHICLES. VOLUME 1 (FINAL REPORT). Olson Labs., Inc., Anaheim, Calif., Office of Air and Waste Management Contract 68-03-0452, Rept. EPA-460/3-75-003-a, 48p., April 1975. 3 refs.

NTIS: PB 242588/AS

Emission tests were performed on catalyst equipped prototype light-duty vehicles to identify which of five existing short-cycle emissions tests is the most capable of being correlated with the Federal Test Procedure as used for the certification of 1975 model year and later light-duty vehicles. The short-cycle emissions tests evaluated were: the Clayton Key Mode,

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the Federal Three Mode, the Unloaded Test, the Federal Short Cycle, and the Composite New Jersey ACID/New York Short Test. Descriptions of each test, the testing sequence, procedural precautions, test equipment, and data preparation are provided. The test data for carbon monoxide, hydrocarbons, and nitrogen oxides are presented as computer printouts in a separate volume (Volume II). (Author summary modified)

51186

APTIC NO. 75385

Gunderson, J. A.

FTP/SHORT CYCLE CORRELATION TESTING FOR 207 (b) IMPLEMENTATION - CATALYST EQUIPPED VEHICLES. VOLUME 2 (FINAL REPORT). Olson Labs., Inc., Anaheim, Calif., Office of Air and Waste Management Contract 68-03-0452, Rept. EPA-460/3-75-003-b, 385p., April 1975.

NTIS: PB 242589/AS

Emissions tests were performed on catalyst equipped prototype light-duty vehicles to identify which of five existing short-cycle emissions tests is the most capable of being correlated with the Federal Test Procedure as used for the certification of 1975 model year and later light-duty vehicles. The short-cycle emissions tests evaluated were: the Clayton Key Mode, the Federal Three Mode, the Unloaded Test, the Federal Short Cycle, and the Composite New Jersey ACID/New York Short Test. Computer printouts of data are presented for emissions of hydrocarbons, carbon monoxide, and nitrogen oxides. Data are also tabulated for fuel analyses, analyzer calibration curves, the constant volume sampler calibration curve, dynamometer calibration curves, and the catalyst test vehicle maintenance history.

51187

APTIC NO. 73770

Hayashi, Hiroshi

SAMPLING OF AUTO EXHAUST GAS. (*Jidosha haigasu no sanpuringu*). Text in Japanese. Nainen Kikan (Internal Combust. Engine), 14(2):103-110, 1975. (Special Issue.)

Automotive exhaust components subject to control include carbon monoxide, hydrocarbons, nitrogen oxides, and diesel smoke. The exhaust emission depends on three operating modes. In Japan, a 10-mode method and an 11-mode method are adopted for light gasoline automobiles and a 6-mode method is adopted for heavy gasoline automobiles. The 10- and 11-mode methods use constant volume sampling while the 6-mode method uses direct sampling. The constant volume sampling method dilutes the exhaust gas with air to approximately 10 times its original volume to prevent condensations of water vapor and high boiling substances. Part of the diluted gas is then sampled and the concentration corresponding to running distance is calculated. Correction of error by constant volume sampling is usually carried out by using a laminar flow meter. The 6-mode method is for vehicles heavier than 2.5 tons or for more than 11 passengers. The 1973 emission standards for the 6-mode method were: CO, 1.6%; HC, 520 ppm; and NOx, 2200 ppm.

51188

APTIC NO. 73760

Larkinson, D. E. and B. R. Jewsbury

A DIESEL ENGINE FOR LIGHT DUTY APPLICATIONS. Preprint, Society of Automotive Engineers, Inc., Warrendale, Pa., 8p., 1975. 2 refs. (Presented at the Society of Automotive Engineers, Automotive Engineering Congress and Exposition, Detroit, Mich., Feb. 24-28, 1975, Paper 750333.)

The design of a naturally aspirated diesel engine for automotive and light-duty applications is described. The engine produces 55 brake horsepower at 4500 rpm and is 10% lighter, 9.4 mm less in height, 25.0 mm shorter, and significantly less noisy than a currently available heavier duty unit rated at 4000 rpm. The engine is capable of meeting the 1977 Federal standards for hydrocarbons, carbon monoxide, nitrogen oxides, and smoke emissions. (Author summary modified)

51189

APTIC NO. 75185

Mathur, Gopal K.

IDENTIFICATION AND CHARACTERIZATION OF THE USE OF MIXED CONVENTIONAL AND WASTE FUELS (FINAL REPORT). Kellogg (M. W.) Co., Houston, Tex., Research and Engineering Development, Environmental Protection Agency Contract 68-02-1308, Task 5, Program Element 1AB014, ROAP 21BCC-042, Rept. EPA-650/2-75-017, 62p., Feb. 1975.

NTIS: PB 241821/AS

A survey of various industries to determine types of mixed and waste fuels and the extent of their usage in stationary combustion equipment was performed. Industries surveyed included petrochemical and chemical processing operations, electrical power generation plants, petroleum refineries, glass manufacturing, cement manufacturing, and textile operations. Types of mixed fuels considered included mixed oils, oil and gas, coal and oil, coal and gas, by-product gases and fuels, by-product chemical waste, and mixtures of chemical wastes and conventional fossil fuels. About 70% of the refineries, 45% of the power plants, 20% of the cement, glass, and textile manufacturers, and 10% of the petrochemical and chemical processing plants reported using mixed fuels to some extent. Mixed fuels were used mainly for steam generation and heat. Sufficient information for calculating emission factors from mixed fuel firing was not generally available; in a few cases estimated emissions or average emissions were provided. (Author summary modified)

51190

APTIC NO. 74278

McMurry, J. R., R. E. Flannery, L. H. Fowler, and D. J. Johnson

AMBIENT SAMPLING FOR STATIONARY AND MOBILE SOURCE HYDROCARBONS IN HOUSTON, TEXAS. Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 14p., 1975. 6 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-45.5.)

The Texas Air Control Board conducted a study from January through February of 1975 to contrast the industrial and vehicular C2-C5 hydrocarbon fractions at an urban and an industrial site in Houston, Texas. One-hour integrated bag samples were collected and analyzed for C2-C5 hydrocarbons. One site was located in the heavily industrialized ship channel area of Houston, and the other in the downtown area. An automotive hydrocarbon signature, normalized to acetylene, was obtained from samples collected in the Washburn Automotive Tunnel. This signature, or ratio, was used to derive the vehicular contribution to the total hydrocarbon burden from the acetylene measured at each site. The findings indicate normal diurnal patterns of automotive hydrocarbons at each site. More than 50% of the total C2-C5 hydrocarbon burden at both sites can be attributed to industrial sources. (Author abstract modified)

51191

APTIC NO. 73897

Miyabe, Hidenari

COMBUSTION AND EXHAUST GAS IN TWO CYCLE ENGINE. (2 saikuru hibana tenka kikan no nensho to haiki). Text in Japanese. Nainen Kikan (Internal Combust. Engine), 14(2):23-29, 1975. (Special Issue.)

Hydrocarbons in the exhaust from 2-cycle engine result from unburned HC at normal combustion, HC from a misfire cycle during abnormal combustion, and HC from fresh air blow-through. Nitrogen oxides concentration in the exhaust from a 2-cycle engine is in the range of 1500-2000 ppm, compared to 4000-6000 ppm in that from a 4-cycle engine. Similar to 4-cycle engines, maximum nitric oxide concentration for a 2-cycle engine appears at an air-fuel ratio of approximately 15. Carbon monoxide concentration in the exhaust depends almost entirely on air-fuel ratio. Measurement results for a 2-cycle engine showed minimum CO concentration at air-fuel ratios higher than 16, which is the same as a 4-cycle engine. To reduce HC

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in the exhaust, a suitable air-fuel ratio in the range of little abnormal combustion is required. To reduce NO_x, a lower air-fuel ratio than the theoretical value is preferred. Water injection is effective for reduction of NO_x in the exhaust. A lower air-fuel ratio than the theoretical value is also preferred for the reduction of CO.

51192

APTIC NO. 73769

Murayama, Tadaashi

BLUE FLAME, WHITE FLAME, AND ODOR IN COMPRESSED AND IGNITED ENGINE. (Asshuku chakka kikan no seien, hakuen, nioi). Text in Japanese. Nainen Kikan (Internal Combust. Engine), 14(2): 50-59, 1975. (Special Issue.)

As many as 1000 components have been detected in diesel engine exhaust, including approximately 100 odorous substances. The major components of exhaust consist of lower alcohols, alkanes, alkylbenzenes, fatty acids, high molecular weight aromatic hydrocarbons, C1-C8 aldehydes, and heterocyclic sulfur compounds. The individual components give various odors ranging from pleasant-sweet to unpleasant-burnt to strong foul. Results of exhaust odor measurement for a 6-cylinder, 2-cycle open combustion diesel engine showed that the exhaust odor was stronger at high and low load but the weakest at medium load. Aldehydes and hydrocarbons concentrations were high at low load operation. The concentrations decreased with increasing load, but increased again at high load. The aldehydes and hydrocarbons concentrations were lowest at the optimum injection period and increased remarkably with decreasing compression ratio. The concentrations also increased with decreasing engine cooling water temperature. Formations of blue and white smokes were greatly affected by the cetane number and volatility of fuel.

51193

APTIC NO. 73893

Nishida, K., T. Honda, and Y. Miyake

ON THE EXHAUSTED ODOR COMPONENT BY SPRAYING PAINTS. (Fukitsuke toso de haishutsu sareru shuki seibun ni suite). Text in Japanese. Kankyo Gijutsu (Environ. Conserv. Eng.), 4(4): 240-247, April 1975. 7 refs.

Measurements of odorous components were conducted at a coating plant having two coating booths and two dryers. The coating plant consumed 40 kg/day of shiner. Sampling was carried out by using a polyester bag with the aid of a diaphragm pump. The odorous gases were analyzed by gas chromatography with flame ionization detector. The separation column was 2.25 by 3 mm stainless tube packed with 5% polyethylene glycol 20 M on 80/100 mesh chromosorb at 50 deg with He as carrier gas at 25 ml/min. Exhaust gases from dryers contained approximately 4 ppm, 5 ppm, 20 ppm, and 50 to 90 ppm of n-propyl alcohol, toluene, xylene, and hydrocarbons respectively. The concentrations from coating booths were 10 ppm, 10-30 ppm, 10-30 ppm, and 50-100 ppm respectively.

51194

APTIC NO. 75151

Paddock, Richard E. and Douglas C. McMann

DISTRIBUTIONS OF INDUSTRIAL AND COMMERCIAL-INSTITUTIONAL EXTERNAL COMBUSTION BOILERS (FINAL REPORT). Research Triangle Inst., Research Triangle Park, N. C., Environmental Protection Agency Contract 68-02-1325, Proj. 43U-893-31, Task 5, Program Element IAB013, ROAP 21ADE-029, Rept. EPA-650/2-75-021, 503p., Feb. 1975.

NTIS: PB 241195/AS

Various joint distributions of individual commercial-institutional and industrial external combustion boilers and total plants are tabulated based on input from the National Emissions Data System. The joint distributions are presented along with selected graphical displays for all types of fuel (oil, coal, and gas). Included are joint distributions for total sulfur emitted within plant capacity and plant fuel sulfur content and total sulfur emitted within boiler capacity and boiler fuel sulfur

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content. Preceding the distributions and marginals, there is a description of the method of their production; following the distributions are a logical flow chart and listings of the computer programs which produced the distributions and graphs. (Author abstract modified)

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APTIC NO. 75345

Reding, John T. and Burchard P. Shepherd

ENERGY CONSUMPTION: THE CHEMICAL INDUSTRY (FINAL REPORT). Dow Chemical Freeport, Texas Div., Environmental Protection Agency Contract 68-02-1329, Task 5, Program Element IAB013, ROAP 21ADE-010, Rept. EPA-650/2-75-032-a, 71p., April 1975. 12 refs.

An energy consumption analysis of the chemical industry is presented in the form of energy consumption block diagrams, energy-intensive equipment schematic diagrams, and tables that indicate the causes of energy losses. The analysis pertains to manufacturing processes that produce 12 of the top 50 volume chemicals in the United States. The most common energy-intensive operations in the industry are furnace combustion, distillation, compression, electrolysis, drying, and evaporation. Energy losses in these operations can be reduced by: design, operation, market, and process modification; better maintenance procedures; process integration; and by-product recovery, including heat recovery.

51196

APTIC NO. 75346

Reding, John T. and Burchard P. Shepherd

ENERGY CONSUMPTION: THREE PRIMARY METALS AND PETROLEUM INDUSTRIES (FINAL REPORT). Dow Chemical, Freeport, Texas Div., Environmental Protection Agency Contract 68-02-1329, Task 5, Program Element IAB013, ROAP 21ADE-010, Rept. EPA-650/2-75-032-b, 59p., April 1975. 26 refs.

NTIS: PB 241990/AS

A study of energy consumption in the primary metals and petroleum industries is presented. Energy-intensive steps for commonly used manufacturing processes are analyzed in terms of energy consumption block diagrams, energy-intensive equipment schematic diagrams, and tables that indicate the causes of energy losses. The most common energy-intensive operations in the primary metals industry are furnace combustion and electrolysis, while those most common in the petroleum industry are furnace combustion and distillation. Energy losses in these operations can be reduced by: design, operation, and process modifications; proper maintenance practices; and by-product recovery, including heat recovery.

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APTIC NO. 75347

Reding, John T. and Burchard P. Shepherd

ENERGY CONSUMPTION: PAPER, STONE/CLAY/GLASS/CONCRETE, AND FOOD INDUSTRIES (FINAL REPORT). Dow Chemical Freeport, Texas Div., Environmental Protection Agency Contract 68-02-1329, Task 5, Program Element IAB013, ROAP 21ADE-010, Rept. EPA-650/2-75-032-c, 60p., April 1975. 28 refs.

NTIS: PB 241926/AS

A study of energy consumption in the paper, stone/clay/glass/concrete, and food industries is presented. Energy-intensive steps for commonly used manufacturing processes are analyzed in terms of energy consumption block diagrams, energy-intensive equipment schematic diagrams, and tables that indicate the causes of energy losses. The most common energy-intensive operations in the paper industry are pulp digestion, evaporation, furnace and kiln operation, and drying. Those for the stone/clay/glass/concrete industry are kiln and furnace operations. Cooking, drying, and refrigeration are the most common energy-intensive operations in the food industry. Energy losses in these operations can be reduced by: design, market, and process modifications; process integration; proper maintenance practices; and by-product recovery, including heat recovery.

51198

APTIC NO. 73894

Sakai, T.

MEASURING METHOD OF AUTO EMISSION GAS AND ITS TREND OF CONTROL. (*Jidosha haishutsu gas sokutei ho to kisei no doko*). Text in Japanese. *Kankyo to Sokutei Gijutsu (Environ. Meas. Tech.)*, 2(3):7-15, March 1975. 9 refs.

The 1976 automotive nitrogen oxides emission standard of 0.25 g/km was delayed for two years until 1978. Temporary standards were set at 0.6 g/km for vehicles under 1 ton and 0.85 g/km for those heavier than 1 ton. Strict standards for carbon monoxide and hydrocarbons were put into effect in April 1975. The new CO and HC standards are 2.1 g/km and 0.25 g/km, respectively. Ten-modes and 11-modes methods are employed in Japan for the measurements of automotive exhausts. Sampling of the exhaust gases is usually carried out by using the constant volume sampler which is composed of a mass flow line and a sampling line. The exhaust gases are released from the vehicle tail pipe to a mixer through flexible tubings. The exhaust gases are diluted with air and the mixture is led to a heat exchanger. Carbon monoxide and CO₂ are analyzed by non-dispersive infrared. Hydrocarbons are determined by a hydrogen flame ionization detector which has the advantages of high sensitivity and wide concentration range. Nitrogen oxides are determined by the chemiluminescence method.

51199

APTIC NO. 73977

Slinn, W. G. N.

ATMOSPHERIC AEROSOL PARTICLES IN SUFACE-LEVEL AIR. In: *Pacific Northwest Laboratory Annual Report for 1974 to the USAEC Division of Biomedical and Environmental Research. Part 3: Atmospheric Sciences. Battelle Memorial Inst., Richland, Wash., Pacific Northwest Labs., Rept. UC-11, p. 85-86, Feb. 1975. 5 refs.*

NTIS: BNWL-1950 PT3

The structures of particle size spectra for various types of aerosols are illustrated by plotting log area distributions as a function of particle diameter. Curves representing clean combustion, fly ash, smog episodes, forest fires, dust storms, sea spray, typical urban pollution, and natural aerosol background levels are presented.

51200

APTIC NO. 74013

Slinn, W. G. N.

A SUGGESTED CONCEPT FOR DYNAMIC WEATHER MODIFICATION UTILIZING LARGE ATMOSPHERIC HEAT RELEASES TO STIMULATE CUMULONIMBUS CLOUDS. In: *Pacific Northwest Laboratory Annual Report for 1974 to the USAEC Division of Biomedical and Environmental Research. Part 3: Atmospheric Sciences. Battelle Memorial Inst., Richland, Wash., Pacific Northwest Labs., Rept. UC-11, p. 253-256, Feb. 1975. 10 refs.*

NTIS: BNWL-1950 PT3

A dynamic weather modification scheme utilizing large atmospheric heat releases to stimulate cumulonimbus clouds is suggested as a possible means for generating hydroelectric power. Specifically, the heat rejected from cooling towers at nuclear power plants might be used to stimulate a cumulonimbus cloud above a mountain plateau. The enticement of warm moist air up from a low plain onto the mountain plateau and into the cloud may be capable of tapping the latent energy invested by the sun in vaporizing the water, thus producing extra rainfall on the plateau. This extra water can then be used for hydroelectric power generation as well as other uses such as irrigation.

51201

APTIC NO. 73879

Springer, Karl J. and Ralph C. Stahman

EMISSIONS AND ECONOMY OF FOUR DIESEL CARS. Preprint, Society of Automotive Engineers, Warrendale,

Pa., 20p., 1975. 18 refs. (Presented at the Society of Automotive Engineering Congress and Exposition, Detroit, Mich., Feb. 24-28, 1975, Paper 750332.)

Emissions and fuel economy tests (Federal Test Procedure) were performed on four diesel-powered passenger cars, a 1972 Mercedes-Benz 220D, a 1973 Peugeot 504D, and Opel Rekord 2100D, and a Nissan diesel-powered Datsun. Hydrocarbons and carbon monoxide emissions as measured on the 1975 Federal light-duty procedure, were both less than Federal limits for 1977-1978, except for the Peugeot. Nitrogen oxides were well within the 1977 standard of 1.3 g/km and ranged from 0.62-0.95 g/km. The chassis version of the 1974 Federal 13-mode procedure for heavy-duty vehicles gave hydrocarbon plus NO_x values of 5.3-9.4 g/kW-hr as compared to the 1974 Federal standard of 21.4 and the 1975 and 1977 California standards of 13.4 and 6.7 g/kW-hr. Hydrocarbons from the Peugeot, however, were about 10 times greater than levels from the other three cars. Nominal odor emissions were 3.2 D intensity units for the Mercedes; similar values were obtained with the other cars except for the Peugeot which exhibited odor intensities about two units above the nominal value. Smoke opacity for the diesels ranged from 2.7-7.4%, with the Mercedes and Peugeot emitting the least smoke. (Author summary modified)

51202

APTIC NO. 73819

Takano, Yoshitaka

RUBBER INDUSTRY AND ENVIRONMENTAL HEALTH. (*Gomu kogyo to kankyo eisei ni suite*). Text in Japanese. *Raba Daifesto (Rubber Plast.)*, 27(1):7-23, Jan. 1975. 14 refs.

The environmental health problems particular to the rubber industry are reviewed. Polymers are primary components and various additives, solvents and adhesives are used and particulate matters, solvent gas, malodor, noise, and vibration present environmental health problems. The type of solvent used, toxicity of solvent gas, tolerable limits, and olfactorily detectable concentrations are described. The measurement method for solvent gas concentration, ventilation systems for solvent gas, and the recovery method for solvent are discussed. A list of emission standards for toxic gases is also given. Five malodorants restricted by malodor control regulations, tolerable limits, and odor intensity and malodorant concentration are discussed with descriptions of malodor problems arising during the vulcanization process and the blending process and deodorizing methods used. With respect to particulate matter, the environmental standards, tolerable limits, the relationship between particle size and emission source, and control measures for reducing the emission of particulates are discussed.

51203

APTIC NO. 73865

Tanner, T. M. and L. A. Rancitelli

TECHNIQUES FOR MEASURING TRACE ELEMENTS IN FUELS AND FUEL ADDITIVES. In: *Pacific Northwest Laboratory Annual Report for 1974 to the USAEC Division of Biomedical and Environmental Research. Part 4: Physical and Analytical Sciences. Battelle Memorial Inst., Richland, Wash., Pacific Northwest Labs., UC-48, p. 19-20, Feb. 1975.*

NTIS: BNWL-1950 PT4

A neutron activation technique for the measurement of trace elements in fuels and fuel additives is described. Samples are transferred from glass bottles to pre-cleaned 30 ml polyethylene vials for irradiation. Two 12 to 15 ml aliquots of each sample are prepared and used for a short and long irradiation. The vials are then heat sealed with a hot high-purity quartz rod. Elements that can be determined include: aluminum, bromine, calcium, copper, chlorine, magnesium, manganese, sodium, tin, titanium, vanadium, zinc, indium, arsenic, gold, potassium, lanthanum, and samarium.

51204

51204

APTIC NO. 74094

RECENT SITUATION OF POLLUTION CONTROL AND ITS COUNTERMEASURE. (*Kogai kisei to sono taisaku saikin no keii*). Text in Japanese. *Tetsu to Ko (Iron Steel)*, 61(5):593-596, March 1975.

In the foundry industry, the types of pollution and pollutant sources are numerous. The present status of pollution and its countermeasures are reviewed based primarily on the survey reports compiled by the General Foundry Center and Foundry Association. The particulate emission concentration was 0.123-0.218 g/N cu m for the flow-frequency induction electric furnace and 0.5-12 g/N cu m for the cupola, while the particulate emission standard for the cupola was 0.2-0.4 g/N cu m. The data on the size distribution and component analysis of particulate matters emitted from the cupola and low-frequency furnace are given. The primary pollutant emitted from the cupola is sulfur oxides, however, the SOx concentration is generally below the emission control standard. As for the particulate matter, the venturi scrubber and bag filter are most commonly used; however, the combined use of cyclone, bag filter or electrostatic precipitator with a wet-type dust collector is most effective. As for the waste water, the pH, BOD (biological oxygen demand), COD (chemical oxygen demand), SS, and oils presented problems; however, all other toxic substances were below environmental standards. Noise pollution and its countermeasure are also discussed. Pollution control in the working environment is discussed in terms of the concentrations of particulate matter, phenol, formaldehyde, acrolein, and odor intensity.

51205

APTIC NO. 74159

Hyogo Prefectural Government (Japan), Div. of Environmental Pollution

AIR POLLUTION CAUSED BY AUTOMOBILE AND ITS COUNTERMEASURES. (*Jidosha kogai no genjo to taisaku*). Text in Japanese. In: *Hyogo Prefectural White Paper on the Environment in 1974*, p. 269-293, 1975.

Air pollution due to automotive exhaust gas was surveyed in Hyogo Prefecture during 1973. Data on carbon monoxide, nitrogen oxide, and hydrocarbon concentrations obtained at 19 monitoring stations and 43 measuring points were compiled and analyzed. The highest CO concentration (1-hour value) was 7.1 ppm, and it showed a decreasing trend compared to 1972 values. It was generally lower than the environmental standard. The highest nitric oxide concentration (one-hour value) was 0.183 ppm with the values being generally unchanged from those for 1972. The highest nitrogen dioxide concentration (one-hour value) was 0.068 ppm, and it showed an increasing trend. The highest lead concentration (eight-hour value) was 1.84 micrograms/cu m, showing generally a decreasing trend. The highest suspended particulate concentration (24-hour average) was 0.139 mg/cu m, showing an increasing trend. The highest sulfur oxide concentration (one-hour value) was 0.055-0.053 ppm.

1974

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APTIC NO. 73884

Aoki, Atsushi, Taka Ishii, and Tsuyoshi Tomiyama

STUDIES ON AIRBORNE DUST PARTICLES BY NEUTRON ACTIVATION ANALYSIS. (*Hoshada bunseki ni yoru taki fuyujin no kenkyu*). Text in Japanese. *Kyoto Furitsu Daigaku Gakajutsu Hokoku (Kyoto Prefect. Univ. Nat. Sc. Liv. Sci. Rept.)*, no. 25-B:25-30, Oct. 1974, 9 refs.

Airborne particulates collected from six areas of three cities by a low volume air sampler equipped with a membrane filter were analyzed by a neutron activation method for 18 elements. The air sample accumulated for a 1-month period was activated as one sample for 5 min or 60 min irradiation by hot neutrons of 1930 n/sq cm/sec. One location, which is close to

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a highway, showed higher bromide and chloride levels (0.054 and 2.8 microgram/cu m in March 1974) than other locations, indicating the effect of automobile exhaust gases. Higher manganese and vanadium levels were found in the heavy industrial areas (as high as 0.11 microgram/cu m for Mn and 0.018 microgram/cu m for V in April 1974). The aluminum, potassium, and sodium levels observed in non-industrial inland locations were nearly the same as their elemental compositions in soil, and the uplift of ground soils was therefore thought to be mainly responsible for these particulates in these areas.

51207

APTIC NO. 73959

Blazowski, William S. and Robert E. Henderson

AIRCRAFT EXHAUST POLLUTION AND ITS EFFECT ON THE U.S. AIR FORCE (TECHNICAL REPORT).

United States Air Force, Wright-Patterson AFB, Ohio, Fuels and Lubrication Div. and Turbine Engine Div., Rept. AFAPL-TR-64, 69p., Aug. 1974, 55 refs.

NTIS, DDC: AD 783828

Information relating to the establishment of an Air Force policy on aircraft engine pollution is presented. Topics covered include: the formation of hydrocarbons, carbon monoxide, nitrogen oxides, and smoke from nonafterburning and afterburning engines (piston and gas turbine); emissions control technology involving engine design and/or operation modifications; cost estimates for current, mid-term, and advanced control technology; Air Force emission goals; and the possibility of Air Force aircraft complying with existing Environmental Protection Agency emission standards. No conclusive air quality assessments of Air Force bases are presently available. It is recommended that the Air Force not elect to comply with EPA standards since this would involve complicated trades which can affect basic engine design and propulsion system effectiveness.

51208

APTIC NO. 74191

Bohn, T.

ENERGY DEMAND AND SUPPLY ANALYSIS.

(*Energiebedarf, Analyse und Moeglichkeit der Deckung*). Text in German. *VDI (Ver. Deut. Ingr.) Ber.*, no. 224:7-12, 1974, 8 refs.

The evolution of energy demand and problems and possibilities of energy supply in West Germany and Europe are discussed with respect to the petroleum crisis. The rate of growth of the energy demand will decrease during the next three decades as a result of a slow-down of economic and population growth. The share of electricity is expected to exceed 20%. Due to the high price and uncertainty in the supply of petroleum, it will be replaced by other forms of energy to the greatest possible extent. Nuclear energy presents itself as the most promising alternative as uranium resources in Europe and throughout the world are abundant. The coupling of electricity generation in power plants with remote heating has acquired particular interest in view of the high price of oil. Nuclear energy will be available, apart from for electricity generation, for remote thermal energy supply in closed carbon monoxide-hydrogen cycle as early as in the next decade, and for coal gasification. Due to the lower temperature required for hydrogenating gasification, this process is expected to be feasible earlier than coal gasification by means of nuclear heat and water vapor.

51209

APTIC NO. 74251

Cardina, J. A.

PARTICLE SIZE DETERMINATION OF TIRE-TREAD RUBBER IN ATMOSPHERIC DUSTS. *Rubber Chem. Technol.*, 47(4):1005-1010, Sept. 1974, 2 refs. (Presented at the American Chemical Society, Rubber Division and Chemical Institute of Canada, Macromolecular Science Division, Joint Meeting, Toronto, Ontario, May 7-10, 1974, Paper 522.)

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Ambient dust within 20 ft of heavy traffic on an expressway was sampled and analyzed for tread rubber by pyrolysis gas chromatography. Dust particles of respirable size (1.1-7.0 micron) accounted for 25-40% of the total by weight, and the remainder of the particles were divided about equally between the size range above 7.0 micron and that below 1.1 micron. The amount of tread rubber in the respirable dusts averaged about 4.3%; that in dust over 7.0 micron in size averaged about 6.3%. The tread rubber content of particles in the respirable range averaged 2.6 micrograms/cu m of suspended particulates and was considered to be of low potential health hazard. (Author summary modified)

51210

APTIC NO. 75369

Conkle, Nick, Vernon Ellzey, and Keshava Murthy

ENVIRONMENTAL CONSIDERATIONS FOR OIL SHALE DEVELOPMENT (FINAL REPORT). Battelle Memorial Inst., Ohio, Columbus Labs., Environmental Protection Agency Contract 68-02-1323, Task 7, Program Element 1AB013, ROAP 21ADD-023, Rept. EPA-650/2-74-099, 132p., Oct. 1974. 29 refs.

NTIS: PB 241942/AS

The results of a literature survey to determine the feasibility and environmental impact of developing a shale oil industry in the United States are presented. Topics covered include: the extent of oil shale deposits, mining and pretreatment processes, in-situ and ex-situ retorting, refuse disposal, and produce treatment and usage. Estimated oil shale reserves constitute the equivalent of 80 billion barrels of oil, and about 70% of the reserves are located on Federally-owned lands. Major impacts of shale oil development on the atmosphere include dust emissions from mining, crushing, sizing, and retorting operations and combustion products such as oxides of sulfur and nitrogen. (Author summary modified)

51211

APTIC NO. 74272

Cramer, Owen P.

AIR QUALITY INFLUENCES. In: *Environmental Effects of Forest Residue Management in the Pacific Northwest. A State-of-Knowledge Compendium*. Dept. of Agriculture, Portland, Oreg., Pacific Northwest Forest and Range Experiment Station, Rept. PNW-24, 52p., 1974. 77 refs.

Air pollution from forest residue fires is discussed in terms of emission characteristics of different burning stages, the effects of different fuel arrangements and burning procedures, and the effects of meteorological conditions on smoke plume behavior. Partial combustion products released from forest fires include particulates, hydrocarbons, and carbon monoxide; nitrogen oxides are also released from such fires as are water vapor and carbon dioxide. Maximum efficiency of combustion is gained with a continuing fire to which fuel is added at a rate that keeps it in the full fire stage and provides for combustion of the distillation products emitted by the added fuels in the start-up stage. Efficiency may be further enhanced by forced draft and recirculation of emissions assuring adequate oxygen, complete combustion of emissions, and a continuing hot fire. Fuels such as duff and rotted wood tend to produce smoke and should be omitted from the burn. The fuels and burning plan can be prepared to minimize the time of startup and die down and thus air pollution using such techniques as pile burning. Ambient air that cools rapidly with increasing height, i.e., unstable air, favors the rise of convective smoke columns to their maximum height. Air pollution potential is greatest when there is little wind and conditions for convective rise and mixing with a deep layer of air are unfavorable.

51212

APTIC NO. 74052

Derouane, Alain and Geert Verduyn

TWENTY-SEVENTH CEBEDEAU-BECEWA 1974 INTERNATIONAL CONFERENCE. STUDY OF CERTAIN FACTORS INFLUENCING INDOOR AIR POLLUTION. (XXVIlles Journees Internationales CEBEDEAU-

BECEWA 1974. *Etude de quelques facteurs influenciant la pollution de l'air a l'interieur des batiments*. Text in French. Centre Belge Etude Doc. Eaux, no. 373:482-488, Dec. 1974. 19 refs.

Studies on the possible sources of indoor air pollution and relationships between indoor and outdoor air pollutant concentrations are presented. The indoor concentrations of sulfur dioxide and aerosols are usually lower than the outdoor concentrations, while carbon monoxide and nitrogen oxides show usually little indoor-outdoor differences. Sulfur dioxide is readily adsorbed by paper, wood, and fiber materials. Domestic heating, hot-water preparation, and smoking are the principal sources of indoor air pollution, and mainly of carbon monoxide and nitrogen oxides. Cigarettes generate aerosol, CO, nitrogen oxides, and hydrocarbons, with a quinine index reaching up to 1450. The heavy hydrocarbon content shows rapid decrease due to the sedimentation of heavy aerosol particles that they adhere to. Air conditioners with water curtains are efficient in reducing the SO₂ concentration, but inefficient with respect to CO.

51213

APTIC NO. 74248

Dickinson, J. Thomas

TRANSPORTATION AND ENERGY CONSERVATION IN THE PACIFIC NORTHWEST (TOPICAL REPORT).

Washington State Univ., Pullman, Physics Dept., Pacific Northwest Regional Commission Contract E-3002, 33p., Feb. 1974. 16 refs.

NTIS: N74-28539

Energy conservation measures in the transportation sector are analyzed for the Pacific Northwest area (Idaho, Oregon, and Washington State). Transportation accounts for 30% of all the energy consumed in the Pacific Northwest region, and automobiles are the leading consumer of transportation energy (55% in 1970). Conservation measures discussed include: a shift to smaller cars, increased urban mass transit use, the use of human-powered modes for short trips, bans on pleasure rides, the elimination of vacation trips, speed limit reductions, Sunday driving bans, and a shift of freight transport to lower intensity modes. Energy utilization data for various models of transportation are presented along with estimates of energy savings resulting from the above conservation measures.

51214

APTIC NO. 75059

Ehrenfeld, John R.

ANALYSIS OF THE COMPOSITION OF THE ATMOSPHERE IN THE LOS ANGELES BASIN (FINAL REPORT). Abcor, Inc., Cambridge, Mass., Walden Research Div., Environmental Protection Agency Contract 68-02-0218, Program Element A1:008, Rept. EPA-650/2-74-105, 80p., May 1974. 29 refs.

NTIS: PB 239466/AS

A material balance model and an inversion technique that produce reasonable estimates of the contribution of different emission sources in the Los Angeles atmosphere are presented. The different sources exhibit very characteristic diurnal patterns. Exhaust is higher on weekdays than weekends by almost an order of magnitude, as is expected in relation to traffic density patterns. The weekday source strength peaks at about 8:30 am and falls off more slowly than does the traffic density, indicating a build-up of hydrocarbons in the morning when atmospheric mixing is limited. The weekend pattern does not show a similar peaking. Estimates of the loss of ethylene and propylene differ by the same order of magnitude as do the reactivities of the two species in smog chamber experiments. The absolute values of the derived source strengths agree reasonably well with estimates derived from automobile density and average emission factors. (Author conclusions modified)

51215

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APTIC NO. 73888

Gauthier, J. C. and J. C. Pillard

TEST RESULTS OF A HIGH EFFICIENCY G.R.C. BURNER FOR 700 MW THERMAL POWER STATIONS. (Resultats d'essais d'un bruleur G.R.C. de hautes performances pour centrales thermiques de 700 MW). Text in French. Rev. Gen. Thermique (Paris), 13(154):763-779, Oct. 1974.

The G.R.C. combined burner, and flame stability, combustion kinetic, and pollutant emission measurements performed on this burner under different conditions are described. The G.R.C. combined burner is a parallel flow burner of vortex jet type. It achieves 3-zone combustion (back combustion with surplus air, precombustion with a lack of air, and a neutral or slightly oxidizing combustion). Text stand measurements with a 7 ton/hr model revealed an average oxides of nitrogen concentration of 260 ppm, of which more than 100 ppm originated from the nitrogen content of the fuel oil used. The sulfur trioxide concentration averaged 17 ppm for an air-excess coefficient of 1.5%, and 25 ppm for an air-excess coefficient of 4%. Stable flame was achieved in a load range of 400 kg to 1200 kg fuel oil per hour. Partial flue gas recirculation up to 30% increased the unburnt solids emission, and considerably reduced these oxides of nitrogen emissions. It may also reduce the SO₃ emission. Water injection in the form of steam resulted in an abatement of the unburnt solids emission. When operated on natural gas alone, the burner generated no carbon monoxide at air-excess coefficients above 1%. Mixed firing of fuel oil with 10 to 90% natural gas is possible.

51216

APTIC NO. 75370

Gorman, P. G., M. Scharg, and E. Trompeter

EMISSION FACTOR DEVELOPMENT FOR THE FEED AND GRAIN INDUSTRY (FINAL REPORT). Midwest Research Inst., Kansas City, Mo., Office of Air and Waste Management Contract 68-02-1324, Task 2, Rept. EPA-450/3-75-054, 47p., Oct. 1974. 15 refs.

NTIS: PB 242282/AS

An evaluation of data used to develop particulate emission factors for alfalfa dehydration plants, grain elevators, and other feed and grain operations is presented. The emission factors, which are expressed in lb of particulates/ton of product, are tabulated for various process points of each operation; total particulate emission factors are also provided. Procedures for deriving emission factors are outlined in an appendix.

51217

APTIC NO. 71653

Hara, S., Y. Tokuda, K. Hirai, and T. Oku

ORGANIC SOLVENTS EMISSIONS FROM PAINTING FACILITIES. (Toso shisetsu tou kara haishutsh sareru yuki yozai ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):443, Nov., 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 294.)

Organic solvents from various painting facilities at six plants at Amasaki city were analyzed. Gas (5-1000 ml) was sampled by using an 1 liter sampling bottle or a syringe and analyzed by gas chromatography with a flame ionization detector. The analytical conditions were as follows: 2-meter column packed with Bentone 34 + DNP; column temperature 70 C; detector temperature 150 C. The major components were o-xylene, m-xylene, p-xylene, ethylbenzene, and toluene, and the concentrations in air near a drum painting room were 22 ppm, 54 ppm, 22 ppm, 48 ppm and 400 ppm, respectively. The solvent-containing gas was treated by combustion, washing, or adsorption, and the direct combustion method was the most effective.

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APTIC NO. 75174

Haws, Richard C.

PRESENTATION OF NEDS EMISSION DATA FOR AIR POLLUTION STUDIES (FINAL REPORT). Research Triangle Inst., Research Triangle Park, N. C., Office of Air and Waste Management Contract 68-02-1096, Proj. 43U-888-5, Task 5, Rept. EPA-450/3-75-026, 53p., Nov. 1974.

NTIS: PB 241491/AS

The National Emissions Data System is described in terms of the nature of its data bank and retrieval programs. The NEDS currently includes identifying data and criteria pollutant emission values for over 75,000 point sources as well as emission and location data for about 3200 area sources. The basic retrieval program for the general user produces a standard format listing which display all relevant descriptive and identifying data as well as estimated and NEDS calculated emissions for each criteria pollutant (particulates, sulfur oxides, nitrogen oxides, hydrocarbons, and carbon monoxide). Computer output on each page consists of data for each process emission source or two county area source entries. In addition to standard-format complete point and area source listings, an abbreviated listing identifying point sources can be produced which display emission-related characteristics and annual emissions for each of the five criteria pollutants.

51219

APTIC NO. 74262

Heimler, Bo

WASTE INCINERATION. ASSESSMENT OF SAVENAS INCINERATOR PLANT WITH RESPECT TO WASTES, FLUE GASES, ASHES, AND SLAG DURING THE JUNE 1973 - MAY 1974 PERIOD. (Avfallsforbranning. En kartering av Savenas Forbranningsanlaggning med avseende pa avfall, rokgas, aska och slagg under tiden Juni 1973 - Maj 1974). Text in Swedish. IVL Swedish Water and Air Pollution Research Laboratory, Stockholm (Sweden), Goteborg Municipal Public Health Board and State Environmental Protection Administration Contract 7-172/72, 46p., Sept. 1974.

Complex assessment of the Savenas waste incinerator plant, Sweden, is presented with respect to the composition of the wastes, flue gas, dust emissions, slag, and water pollution during the June 1973 - May 1974 period. The incinerator temperature ranges from 900 to 1000 C. The flue gases are cooled to about 300 C during heat generation, and pass through an electrostatic precipitator and multicyclone for dust separation, after which they are discharged through a 120-meter high stack. The residual dust concentration in the cleaned gas, standardized for dry gas and 10% carbon dioxide, averages 250 mg/cu m. The specific dust emission amounts to 14 kg/hr per furnace, and to 1.2 kg per ton of waste. The residual dust contains 0.17 mg/kg mercury, 0.82 mg/kg cadmium, 22.2 mg/kg lead, 96.7 mg/kg zinc, 1.6 mg/kg manganese, 1.1 mg/kg copper, 0.8 mg/kg chromium, and 0.42 mg/kg nickel. Some 45-55% of the residual dust was larger than 10 micron, and about 10-15 wt% were in the over 40-micron fraction. The sulfur dioxide plus sulfur trioxide, hydrochloric acid, hydrofluoric acid, oxides of nitrogen, and mercury vapor concentrations in the flue gases averaged 223 mg/cu m, 890 mg/cu m, 7.7 mg/cu m, 29 mg/cu m, 76 mg/cu m, and 383 mg/cu m, respectively.

51220

APTIC NO. 73778

Kaji, Shin

KEIYO INDUSTRIAL AREA: ON ITS DEVELOPMENT AND AIR POLLUTION COUNTERMEASURES. (Keiyo kogyo chitai: sono zosei to taiki osen taisaku o megutte). Text in Japanese. Taiki Osen Nyusu (Air Pollution News), no. 84:2-9, Sept. 1974.

Industrial growth in Tokyo began in 1940, under long-term industrial planning by the Ministry of Home Affairs, when 198 ha of offshore land in southern Chiba Bay (part of Tokyo Bay) were filled in to accommodate Hitachi Airplane KK. Present

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growth began in 1950 when the Kawasaki Steelworks was enticed to locate in the area through joint efforts of Chiba Prefecture, Chiba City, and the Ministry of International Trade and Industry. Growth has continued unabated to the present day, with off-shore land being filled in for industrial expansion. By 1955, red smoke from the steelworks was causing pollution problems, but in those times, economic benefit brought to the community and prefecture by industry was the only objective. In 1957 there was an abortive prefectural study of pollution control regulations, and street noise control laws (excluding factory and traffic noises) were promulgated. In 1959 rudimentary water and air pollution analyses were begun, and some sulfur dioxide and dust measurements were taken, but never in the neighborhood of pollution-producing industries. As late as 1962, despite prefectural complaints, the attitude of the national government was to emphasize industrial development first, and to clean up only after the actual appearance of pollution. By 1966, pollution countermeasures were being pushed, and in 1968, the first pollution control agreement was concluded among 40 companies. Further progress against pollution is being made, but other problems occur, such as relocation of those affected by pollution control regulations. A map and table of industrial development are included.

51221

APTIC NO. 74025

Kesselring, R. C., K. M. Gorji, W. S. Young, W. E. Rodgers, and E. L. Knuth

FLAME CHARACTERIZATION PROBES (FINAL REPORT). Rockwell International Corp., Canoga Park, Calif., Rocketdyne Div. and California Univ., Los Angeles, School of Engineering and Applied Science, Environmental Protection Agency Contract 68-02-0628, Program Element 1AB014, ROAP 21ADG-51, Rept. EPA-650/2-74-023, 204p., March 1974. 86 refs.

NTIS: PB 232287

Techniques for the measurement of temperature, stable and unstable chemical species, and velocity (magnitude and direction) in high temperature dirty flames were investigated in an effort to characterize flame environments that result from the burning of coal and/or residual oil. A pneumatic venturi pyrometer was selected for temperature measurement, and a five-hole pitot probe was chosen for velocity measurement. A quick-quench species probe was selected for the measurement of the stable species nitric oxide, molecular hydrogen, molecular oxygen, carbon monoxide, sulfur dioxide, carbon dioxide, molecular nitrogen, nitrogen dioxide, and argon; while molecular-beam mass spectrometry was chosen for the determination of the unstable species atomic oxygen, hydroxyl radical, atomic nitrogen, and atomic hydrogen. The three probes were fabricated, and satisfactory operation was achieved with a premixed gas flame. (Author abstract modified)

51222

APTIC NO. 75146

King, W. R. and J. K. Ferrell

FLUORIDE EMISSIONS FROM PHOSPHORIC ACID PLANT GYPSUM PONDS (FINAL REPORT). North Carolina State Univ., Raleigh, Environmental Protection Agency Grant R-800950, Program Element 1AB015, ROAP 21AFA-075, Rept. EPA-650/2-74-095, 323p., Oct. 1974. 29 refs.

NTIS: PB 241144/AS

Fluoride emissions from gypsum ponds receiving process water from wet-process phosphoric acid plants were measured, and computer simulations of pond emissions and ambient air concentrations were developed. Measured ambient air fluorine concentrations for 95 usable samples obtained at two pond sites ranged from 00000015 to 00000415 moles/cu m. Emission estimates developed from the pond-to-air mass transfer coefficient and the vapor pressure of fluorine over pond water were used along with a standard atmospheric pollutant dispersion model to predict ambient fluorine concentrations. A comparison of the predicted fluorine values with mea-

sured fluorine values demonstrated the validity of the emission estimates.

51223

APTIC NO. 74022

Kirsch, J. W. and B. F. Mason

EXPLOR - EXAMINATION OF POLLUTION LEVELS OF ROADWAYS (FINAL TECHNICAL REPORT). Systems, Science and Software, LaJolla, Calif., California Air Resources Board Contract ARB-659, Proj. SD-207-7, Rept. ARB-R-659-74-28, SSS-R-74-2029, 95p., Jan. 15, 1974. 12 refs.

NTIS: PB 236713

A conservation of mass mathematical model with a second order advection-diffusion scheme known as EXPLOR (Examination of Pollution Levels on Roadways) is used to calculate off-roadway ground level carbon monoxide concentrations. The model is currently available for production use and is validated by comparisons of predicted concentrations with measured data taken at four California locations which include at-grade and cut and fill sections. The calculated values show a mean error of -0.34 ppm and a standard deviation of 1.09 ppm which is within the experimental error of supplied traffic data. A users guide for the models computer program is included. (Author conclusions modified)

51224

APTIC NO. 75130

Leppard, William R.

SULFATE CONTROL TECHNOLOGY ASSESSMENT. PHASE 1. LITERATURE SEARCH AND ANALYSIS. Exxon Research and Engineering Co., Linden, N. J., Products Research Div., Office of Air and Waste Management Contract 68-03-0497, Task 1, Rept. EPA-460/3-75-002-a, 49p., Nov. 1974. 61 refs.

NTIS: PB 240995/AS

The fate of sulfur oxides in automotive exhaust systems equipped with catalytic converters is discussed. Conversions of sulfur dioxide to sulfur trioxide greater than 50% are thermodynamically possible at typical catalyst temperatures, with equilibrium conversion being strongly dependent on oxygen concentration. Exhaust SO₃ may hydrate to gaseous sulfuric acid within the vehicle's exhaust system; the gaseous H₂SO₄ begins to condense at about 150 C. The reduction of both SO₂ and SO₃ by carbon monoxide in the exhaust is favorable. The formation of ammonium sulfate is favored only at temperatures below 225 C. The reaction of SO₂ and SO₃ with the iron oxide surface of the exhaust system occurs below 425 C, and the reaction of SO₃ with the aluminum oxide catalyst substrate is possible below this temperature also. The rate limiting step in the catalytic oxidation of SO₂ is the surface reaction between adsorbed oxygen and adsorbed SO₂. The most promising means of removing SO₃ from the exhaust stream is to react it with a basic metal oxide, with the preferred sorbent being calcium oxide. (Author summary modified)

51225

APTIC NO. 74117

Moriya Shinji and Takeshi Yoshida

AN ANALYTICAL STUDY OF THE RELATION BETWEEN RUNNING CONDITION AND EXHAUST GAS EMISSION IN AUTOMOTIVE VEHICLES.

(Jidosho no soko joken to haishutsu gasuryo no kaiseikiteki kenkyu). Text in Japanese. Nihon Daigaku Kogakubu Kiyo (J. Coll. Eng., Nihon Univ.), no. 15-A: p. 55-69, March 1974. 2 refs.

A steady-state method of estimating automobile exhaust gas emissions during transitional operation was established. Actual running tests in four-mode and random operation were conducted to verify the validity of the method. A four-cylinder, four-cycle, water-cooled gasoline engine was used for the study. Hydrocarbon and carbon monoxide concentrations in the exhaust were estimated within 20% accuracy during random running conditions. The estimation of nitrogen oxides by the same method was not successful.

51226

APTIC NO. 73945

Myers, John L.

CHRYSOTILE ASBESTOS IN PLASTICS. Preprint, Society of Plastics Engineers, Stamford, Conn., 11p., 1974. 13 refs. (Presented at the Society of Plastics Engineers. Annual Technical Conference, 32nd, San Francisco, Calif., May 14, 1974.)

The use of asbestos in the plastics industry is reviewed in relation to its potential occupational hazard, methods for controlling dust emissions, and manufacturing processes that reduce the potential for asbestos release from plastics. The plastics industry uses primarily chrysotile asbestos which is considered to be less hazardous than crocidolite and amosite. Approximately 90% of the asbestos used is in products where the asbestos is locked in or bound with cement, plastics, or other binders to prevent airborne contamination. Dust levels in the asbestos industry are generally within acceptable standards or very near compliance. Control measures used include the wetting of asbestos products, the use of filtered ventilation systems, vacuum clean up and other maintenance procedures, and special packaging. Lung diseases from asbestos exposure occur primarily in workers with high, long-term exposures to the dust. Lung cancer is uncommon among asbestos workers who have no history of cigarette smoking, although there is some evidence that mesothelioma can occur after brief exposures to relatively high fiber levels.

51227

APTIC NO. 74058

Niehaus, F. and H. Engelhardt

COMPARATIVE DESCRIPTION OF POLLUTANT LOADS. (Vergleichende Darstellung atmosphärischer Schadstoffbelastungen). Text in German. VDI (Ver. Deut. Ingr.) Ber., no. 224:127-141, 1974. (Presented at the Non-Conventional Energy Systems, VDI Conference, Duesseldorf, Germany, 1974. 14 refs.)

The specific pollutant loads generated by different energy carriers and different energy transformation methods are compared, and a global model of atmospheric carbon dioxide is presented. Oil-fired power plants would cause sulfur dioxide emissions in excess of the limit value, while coal-firing power plants would exceed the SO₂ limit in a short time due to the increasing energy demand. The use of natural gas and nuclear energy is most advantageous environmentally. The specific CO₂ emissions per unit of energy generated are lowest for methane and natural gas. The CO₂ emission, capable of causing a global increase in temperature, can be reduced by the increased use of nuclear energy and other non-conventional sources of energy at the expense of fossil energy carriers.

51228

APTIC NO. 71654

Oya, F., K. Yoshitani, T. Kanaji, T. Hara, Y. Himi, I. Tachibana, and E. Yoshinaga

AIR POLLUTANT EMISSION FACTOR FROM STATIONARY COMBUSTION PLANT (REPORT 2) EMISSION OF NOX. (Kotei nensho shisetsu karano taiki osen bushitsu no haishutsu keisu (dai ni ho) kakushu nensho shisetsu ni okeru chisso sankabutsu no haishutsu jokyō). Text in Japanese. Taiki Osen Kenkyū (J. Japan. Soc. Air Pollution), 9(2):414, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 265.)

Nitrogen oxides emissions from large-scale fixed sources in Kanagawa Prefecture were measured and the emission coefficients were calculated. The facilities subjected to the investigation included boilers and various furnaces using heavy oil, light oil, gas, and cokes as fuel. Nitrogen oxides concentrations in flue gases were determined by chemiluminescence. The emission coefficients were as follows: boilers, 44.4 and 66.9 kg/100 million kcal fuel (C heavy oil) and 23.3 and 34.5 kg/100 million kcal fuel (A heavy oil); continuous glass melting furnaces, 427 and 299 kg/100 million kcal fuel for B and C heavy oil respectively; batch type glass melting furnaces, 115,

226 and 413 kg/100 million kcal fuel for gas, light oil and B heavy oil, respectively; cupola furnaces, 0.04 and 0.08 kg/ton product for cokes; and incinerators, 0.78 and 1.29 kg/ton charge for A heavy oil.

51229

APTIC NO. 73933

Schaefer, H.

CURRENT PROBLEMS OF THE IMPACT OF ENERGY USE BY TRAFFIC AND SPACE HEATING ON THE ENVIRONMENT. (Die Fragen des heutigen Einflusses durch den Energieeinsatz im Verkehr und Raumheizung auf die Umwelt). Text in German. Elektrotechnik, 52(13):720-727, Oct. 1974.

Almost 60% of the total final energy demand in West Germany is due to space heating and transportation, in which sectors fuel is mainly burned in boilers, stoves, and small-capacity engines. The fuel utilization efficiency in such small units is usually much lower than in large units; moreover, these units are mostly operated under unsteady conditions such as load changes which are disadvantageous to energy economy. The share of the pollutant emissions (except sulfur dioxide emissions) generated by space heating and transportation within the total emission is much higher than the energy demand of these sectors compared with the total energy demand. The total lead emission and most of the carbon monoxide and hydrocarbon emissions are generated by transportation. Transportation is responsible for half of the total nitrogen oxides emissions, while the shares of domestic heating and industry and 27% and 22%, respectively. Improvement of the efficiency of energy utilization and increased energy economy, e.g., by switchover from individual to central space heating, improved thermal insulation, introduction of Wankel engines, and by transferring the primary energy conversion to large-capacity facilities with adequate emission control devices from small units (i.e., in the form of remote heating and electrically powered vehicles), will be essential for emission abatement.

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APTIC NO. 73854

Schiffers, Ansgar

DO WET COOLING TOWERS AFFECT THE ENVIRONMENT ADVERSELY? (Sind grosse Nasskuehltuerme umweltfreundlich)? Text in German. Energie (Munich), 26(7/8):228-234, July/Aug. 1974. 10 refs.

The advantages and ecological disadvantages of wet cooling towers are discussed. The air emitted by wet cooling towers is practically salt-free, and the cooling water brings about a considerable reduction of the dust and sulfur dioxide content in the power plant flue gases. The increase caused by wet cooling towers in the yearly precipitation is negligible, and so is the reduction in the duration of solar radiation on sunny days. Wet cooling towers do not increase the fog incidence, but they may prolong existing fog by about 20 min. Precipitation and ice formation during the cold season around wet cooling towers can be controlled by droplet separation. The ecological disadvantages of wet cooling towers are far outweighed by the advantages.

51231

APTIC NO. 73889

Schikarski, Wolfgang

THE ANTICIPATED EFFECTS OF ENERGY CONSUMPTION IN WEST GERMANY ON THE ENVIRONMENT. (Die voraussichtlichen Auswirkungen des Energieverbrauchs in der Bundesrepublik Deutschland auf die Umwelt). Text in German. Elektrizitätswirtschaft, 73(19): 535-540, 1974. 7 refs.

The expected environmental impact of energy generation in West Germany during the period ending in 1985 is forecast. The primary energy carrier consumption is expected to rise by 4.3% during the investigation period, and the shares of nuclear energy, petroleum, and natural gas will increase considerably, while soft coal consumption will decrease. There will be no considerable change in the brown coal consumption. The

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forecasts indicate increases especially in sulfur dioxide and particulate emissions. The SO₂ emissions can be abated by the use of low-sulfur or desulfurized fuel, and by flue gas desulfurization. The reduction of the sulfur content in light fuel oil from 0.5% to 0.3% will result in a reduction in the annual SO₂ emission by 330,000 tons. The direct desulfurization of distillate residues from 3.5% to 1% at a yearly capacity of 5,000,000 tons would reduce the yearly SO₂ emission by 400,000 tons. The sulfur content in power plant coal will be reduced to 1%.

51232

APTIC NO. 74247

Schweizer, P. F.

DETERMINING OPTIMAL FUEL MIX FOR ENVIRONMENTAL DISPATCH. *IEEE (Inst. Elec. Electron. Engrs. Trans. Autom. Control)*, AC-19(5): 534-537, Oct. 1974. 5 refs.

A method for obtaining the optimal mix of high and low sulfur fuels for users such as electric utilities and large industrial complexes is mathematically developed. The methodology is based on a minimum energy with penalty function and may be used with existing economic dispatch models and programs. Assuming generation plant fuel costs, costs of buying power from other centers, and transmission costs, the economic dispatch program calculates the desired generation schedule for each plant. A control model is used to calculate new fuel costs, using the generation schedule and environmental limits. The economic dispatch program may be used along with the new fuel costs to develop new generation schedules, with the procedure being followed until a desired equilibrium is achieved. Pollutant dispersion models are used to describe the transport of pollutants from the emission point to a monitor or particular receptor locations. The optimal fuel mix method is applied to an example involving an electrical power plant (controlled source) and an urban area (uncontrolled source) with one monitored location.

51233

APTIC NO. 75141

Shannon, Larry J., P. G. Gorman, M. P. Schrag, and D. Wallace

EMISSIONS CONTROL IN THE GRAIN AND FEED INDUSTRY: VOLUME II - EMISSION INVENTORY (FINAL REPORT). *Midwest Research Inst., Kansas City, Mo., Office of Air and Waste Management Contract 68-02-0213, Rept. EPA-450/3-73-003-b, 99p., Sept. 1974. 4 refs.*

NTIS: PB 241234/AS

A particulate emissions inventory for the grain and feed industry is presented along with projected emissions for the years 1975 and 1980. Emission calculations are given for the latest year that production data are reported (generally 1969-1971). Current levels of control are calculated by assuming that cyclones are 90% efficient and fabric filters 99% efficient. The following assumptions are made concerning the future extent of control when projecting emissions to 1975 and 1980: a linear relationship exists between the present and future level of emissions; large operations located mainly in urban areas will reach 100% application of the most efficient control devices by 1985; smaller operations will reach 100% control by 1990 or 1995; and application of control at small operations in rural areas will increase at a fixed rate (e.g., 3%/yr).

51234

APTIC NO. 74116

Suzuki, Taku

ENVIRONMENTAL PROBLEMS AND CONTROL IN PAPER AND PULP INDUSTRY. (*Kami purupu sankyo ni okeru kankyo mondai to tosha no kankyo kanri ni tsuite*). Text in Japanese. *Sangyo Kogai (Ind. Public Nuisance)*, 10(12):2387-2395, Dec. 1974.

Environmental pollution in the Japanese paper and pulp industry is reviewed. The percentage of equipment investment for pollution control was 16.5% in 1972, 23.6% in 1973, and 28.6% in 1974. Waste water disposal, odor control, and solid waste

disposal are the three major environmental problems in the industry. The emission of oxides of sulfur and nitrogen for stack discharges is also a problem.

51235

APTIC NO. 75085

Terry, Herbert and Stephen Nagy

SYSTEM ANALYSIS OF AIR POLLUTANT EMISSIONS FROM THE CHEMICAL/PLASTICS INDUSTRY (FINAL REPORT). *Snell (Foster D.), Inc., Florham Park, N. J., Environmental Protection Agency Contract 68-02-1068, Program Element 1AB0195, ROAP 21AXM-060, Rept. EPA-650/2-74-106, 293p., Oct. 1974. 63 refs.*

NTIS: PB 239880/AS

A systems analysis of air pollutant emissions from the chemical/plastics industry is presented. Major processes are described in terms of equipment, reaction conditions, specific process chemicals, and general air pollution controls. A decision model is used to relate the interactions of such factors as total population exposed, production volume, growth trends, emission, odor, and hazard potential of the most likely pollutants. Polyurethanes, acrylics, and alkyd resins are identified as the most likely candidates for in-depth study, and estimates of emission factors along with a discussion of emission controls and costs are provided for these compounds. Similar information is provided for such high-volume plastic materials as polyethylene, polystyrene, polypropylene, nylon, and polyvinyl chloride. Most of the pollution control devices used in the industry are associated with large volume resin manufacture and function primarily to recover product or heat values; in most instances economics dictate against installing control devices solely for pollution control. Probable emissions identified include: solvent vapors, various hydrocarbons, alcohols, aldehydes, organic acids, and amines.

51236

APTIC NO. 75229

Tischer, Robert L., Kent J. Eisentraut, Karl Scheller, Robert E. Sievers, Robert C. Bausman, and Patricia R. Blum

NEW RARE EARTH ANTIKNOCK ADDITIVES THAT ARE POTENTIAL SUBSTITUTES FOR TETRAETHYL LEAD (INTERIM TECHNICAL REPORT). *Air Force Systems Command, Wright-Patterson AFB, Ohio, Chemistry Research Lab. and Aerospace Fuels Lab. and Technology, Inc., Dayton, Ohio, Air Force Proj. 7023, DoD Element 61102F, 70230407, Rept. ARL 74-0170, 118p., Dec. 1974. 42 refs.*

New rare earth antiknock gasoline additives were assessed as potential substitutes for tetraethyl lead. The screening of lanthanide beta-diketonate chelates with American Society for Testing and Materials knock-rating procedures revealed that some of these chelates can function as antiknock additives in gasoline. Tetrakis (2,2,6,6-tetramethyl-3,5-heptanedionato)cerium(IV) was superior to tetraethyl lead as an antiknock agent when tested by the Supercharge Method (ASTM D909-67), though its performance was inferior to that of TEL during all other tests. Unseparated rare earth chelates derived from an inexpensive ore exhibited antiknock effectiveness approximately equivalent to Ce(thd)₄ in motor octane number tests. Although toxicity data on Ce(thd)₄ is sparse at present, no obvious problems are observed in mice fed 10 mg of Ce(thd)₄ daily. The expected combustion products of rare earth chelate additives are the metal oxides.

51237

APTIC NO. 74088

Voss, A., V. Bundschuh, M. Meliss, and D. Oesterwind

OTHER SOURCES OF PRIMARY ENERGY. (*Andere Primärenergiequellen*). Text in German. *VDI (Ver. Deut. Ing.) Ber.*, no. 224:117-125, 1974. 18 refs.

Non-conventional energy sources and achievements in their utilization are described. The known potentials of geothermal energy that are currently available are rather limited, while the utilization of suitable dry geothermal layers by the injection of water would require sizable investments. The steam extracted

from the deep rock formations contains harmful particulates and gases, such as hydrogen sulfide. The energy resources available in the form of tidal energy are limited to a few geographically suitable areas. The intermittent power supply is another drawback of tidal power plants. Wind energy can be transformed into electricity in a simple manner. Some 20% of the total energy demand of the USA is expected to be supplied by wind power plants in the USA in the year 2000. Power plants utilizing the heat reserves of the oceans based on the heat pump principle, using ammonia or other low-boiling media and glacier water are anticipated to be able to supply large amounts of energy, but at the same time they imply considerable energy transportation costs. None of these non-conventional primary energy sources can immediately relieve the present situation created by the oil crisis.

51238

APTIC NO. 75149

Wagoner, Denny E., Franklin Smith, and D. Gilbert

GUIDELINES FOR DEVELOPMENT OF A QUALITY ASSURANCE PROGRAM: VOLUME XIII - TEST FOR LEAD IN GASOLINE BY ATOMIC ABSORPTION SPECTROMETRY. Research Triangle Inst., Research Triangle Park, N. C., Environmental Protection Agency Contract 68-02-1234, Program Element 1HA327, ROAP 26BGC, Rept. EPA-650/4-74-005-m, 57p., Nov. 1974. 16 refs.

NTIS: PB 241264/AS

Quality control guidelines for the atomic absorption determination of the total lead content of gasoline within the concentration range of 0.010 to 0.10 g Pb/gal are presented. The guidelines are organized into an operations manual and quality assurance procedures. The former covers equipment selection, reagents, calibration, sample analysis, calculations, and data reporting. The latter covers the functional analysis of the measurement method, the collection of information to identify trouble, an independent performance audit, and data quality assessment. The reference method for the determination of lead in gasoline by atomic absorption spectrometry is included in an appendix.

51239

APTIC NO. 72095

Yoneda, H. and Y. Takabayashi

INVESTIGATION ON NOX AND OTHER POLLUTANTS FROM STATIONARY SOURCES. (II) CUPOLA. (Kotei hasseigen kara hassei suru chisso sankabutsu nado ozen bushitsu chosa. (II) Kyupora). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):407, Nov. 1974. (Presented at the National Air Pollution Research Conference, Nov. 6-8, 1974, 15th, Chiba, Japan, Paper 258.)

The emissions of nitrogen oxides, sulfur dioxide, and hydrocarbons from cupolas were measured at 20 facilities in Osaka. The NOx emitted from cupolas is primarily nitric oxide, and the concentration was stable in the range of 10-30 ppm. The average emission coefficient obtained was 0.041 kg nitrogen dioxide/ton. The total HC concentration was in the range of 10-30 ppm, and the average emission coefficient was 0.01 kg methane/ton. The SO2 concentration showed little variation with time, similar to the case of NOx. The absorption rate by cast iron was calculated, based on the theoretical emission quantity of SO2 from coke and the measured value of SO2 emitted. The absorption rates were in the range of 57-93%, and 71% for a small scale cupola, 78% for a medium scale, and 85% for a large scale. The variation due to the type of cupola was slight.

51240

APTIC NO. 74197

Yoshida, Katsumi, Shoichi Yokota, Motohide Murata, Teruyuki Tsujikawa, Masayoshi Kitabatake, Shigeru Igarashi, Hozumi Tamura, and Masahito Kimoto

DETERMINATION OF MOBILE EMISSION SOURCES (AUTOMOBILES) NOX EMISSION COEFFICIENT

AIR POLLUTION ABSTRACTS, OCTOBER 1975

AND CALCULATION OF EMISSION QUANTITY. (Ido hasseigen (jidoshu) no NOx haishutsu keisu no settei oyobi haishutsuryo no suitei). Text in Japanese. Mie-ken Kogai Senta Nenpo (Mie Prefect. Pub. Nuisance Center Annu. Rep.), no. 2:13-19, March 1974. 7 refs.

The nitrogen oxide emission factor for motor vehicles in the Yokkaichi region of Mie Prefecture, Japan was calculated. The calculations covered the years 1972 through 1985. The projected area growth and development, pollution regulations usage and type of cars, and mobility of motor vehicles were assumed to follow preordained patterns based on the present state of affairs.

51241

APTIC NO. 71799

Kumamoto City Public Health Agency (Japan), Dept. of Health, Pollution Control Division

REPORT OF POLLUTION INVESTIGATIONS IN KUMAMOTO CITY (REPORT NO. 8). (Kumamoto-shi ni okeru kogai chosa hokoku (Dai-8-ho)). Text in Japanese. 211p., July 1974.

This report is a collection of data for Kumamoto City, Kyushu, Japan, for 1973, concerning pollution levels, sources, complaints, countermeasures, regulations, and meteorological and geographical observations. Types of pollution included in the report are atmospheric (meteorological aspects, dust, sulfur oxides, carbon monoxide, nitrogen oxides, photochemical oxidants, hydrocarbons, lead); noise (including automobile and airplane noises); water (including mercury contamination); and malodor.

51242

APTIC NO. 72138

Japan Environmental Agency

NEW DEVELOPMENTS IN ENVIRONMENTAL PROBLEMS. In: *Quality of the Environment in Japan*. p. 25-57, 1974.

The relationship between environmental policy and the petroleum situation in Japan is discussed. Air pollution caused by particles of dust and soot improved with increased usage of petroleum, while pollution by sulfur oxides and carbon monoxide worsened. The most serious pollutants are nitrogen oxides, hydrocarbons, and oxidants. The influence on environmental conservation caused by the reduction in crude oil imports due to the oil crisis is illustrated. By causing a reduction in absolute volumes of secondary product manufacture, distribution, and consumption, the reduction in crude oil supply reduces the volume of pollutants. This oil reduction also reduces high quality fuels low in sulfur, and may also increase pollution. Basic directives for an environmental policy were developed and include: compliance with automobile exhaust standards (in spite of increased fuel use), energy saving measures, and development of energy sources within Japan. Environmental problems which will be associated with increased development are discussed for industrial development and high speed transportation.

51243

APTIC NO. 73807

Himeji Municipal Office, Bureau of Health and Environment

DATA RELATED WITH THE ENVIRONMENTAL POLLUTION CAUSED BY AUTOMOBILE. (Jidoshu kogai kankei). Text in Japanese. In: *Himeji-shi no Kogai* (Environmental Pollution in Himeji City), p. 127-135, Oct. 1974.

Data on environmental pollution caused by automobiles in Himeji city for fiscal year 1973 are compiled. Results of constant monitoring of traffic noise showed an average of 0.67-0.74 horn. The environmental standards and maximum allowable traffic noise levels are given. Data on daily average and maximum concentrations of carbon monoxide, nitrogen dioxide, and nitric oxide obtained by a constant monitoring system during the fiscal year 1973 are compiled. The monthly average, maximum 1-hour value and maximum daily average (ppm) were 3.9, 14-16.5, and 7.0-10.0 for CO, 0.035, 0.33, and 0.121

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for NO and 0.017, 0.09, and 0.046 for NO₂, respectively. The average, maximum, and minimum CO, NO, NO₂, sulfur dioxide, dust and lead concentrations are also tabulated with traffic volumes.

51244

APTIC NO. 73898

Mie Prefectural Government (Japan), Div. of Environment

MALODORS. (Akushu). Text in Japanese. In: 49-Nendo Mie-ken Kankyo Hakusho (1974 Mie Prefecture Environmental White Paper), p. 133-140, Dec. 1974.

Malodor problems in Yokkaichi City, Japan, are described. Of the 734 malodor complaints received by authorities in Mie Prefecture during 1973, 492 cases were from Yokkaichi City. The next highest number of area complaints was 57. Complaints occurred most frequently in summer, because of summer winds, and because more households left their windows open. Although most complaints came from areas adjoining the petrochemical complexes, there was quite a decrease from the number of complaints received in 1972. Malodor (aldehyde, aromatic hydrocarbon, aliphatic hydrocarbon) control measures put into operation at the complexes doubtlessly contributed to the decrease. Malodors due to methylmercaptan, methyl sulfide, and hydrogen sulfide need to be controlled further. Regulation of hydrocarbon emissions as a countermeasure for malodors and photochemical smog has been continuing since June 1973. Acetaldehyde emission standards (0.08 ppm at plant area limits) were established in April 1974. Malodors from stock raising have standards which were met by February 1974: ammonia, 1.0 ppm; trimethylamine, 0.005 ppm; hydrogen sulfide, 0.02 ppm; methylmercaptan, 0.002 ppm.

51245

APTIC NO. 74089

Kanagawa Prefectural Government (Japan)

SUMMARY OF THE ENVIRONMENTAL POLLUTION. (Kogai no gaikyo). Text in Japanese. In: 49 nendo Kogai Hakusho (Environmental White Paper in 1974), p. 6-8, Dec. 1974.

In Kanagawa, the designated pollutant sources are 8600 facilities for smoke emission, 530 facilities for particulate matter, and 230 storage facilities for hydrocarbons and 60% of these pollutant sources are concentrated in the Yokohama and Kawasaki littoral area. The consumption of heavy oil in the Keihin area increased to 8.2 million kl in 1973 from 7.11 million kl in 1972; however, the average sulfur content was decreased to 0.45% in 1973 compared to 1.29% in 1970. The sulfur oxide concentration measured in 1973 remained at the same level or decreased compared to that of 1972 at all locations. The pollution level from fixed sources generally was unchanged or decreasing, while the pollution due to mobile sources such as automobiles showed an increasing trend. Fairly high nitrogen oxides and hydrocarbon concentrations were recorded, and the number of people afflicted by photochemical smog increased. The number of smog forecasts issued was 30 compared to 31 in 1972.

51246

APTIC NO. 74104

Kyoto City (Japan), Dept. of Environmental Pollution Countermeasures

ON SURVEY RESULTS OF CARBON MONOXIDE CONCENTRATIONS AT INTERSECTION OF SHIJO KAWARA-MACHI. (Shijokawara-machi kosaten ni okeru issanka tanso nodo sokutei kekka ni tsuite). Text in Japanese. In: Kyoto-shi ni Okeru Kogai Gyosei no Ayumi: Kogai Kankei Koho Shiryosho p. 65-66, March 31, 1974.

Carbon monoxide (CO) concentrations were measured at the southeast corner of the intersection of Shijokawara-machi, Kyoto City, Japan from October 1973 to March 1974. Monitoring was conducted 1.8 m above the ground. The yearly average of the monthly average CO concentrations for 1972 (April 1972-March 1973) was 7.7 ppm; for April 1973-March 1974, it was 6.6 ppm. Hourly CO values from October to March

ranged from 0.5-20.0 ppm. Daily average of the hourly values ranged from 1.5-12.5 ppm. Hourly CO measurements over 10 ppm were found at least 10% of the time each month during the hours the measurements were taken. No 8-hour average of the hourly values exceeded 20 ppm. There were 11 days during the 6-month period when the daily average value of the hourly CO values exceeded 10 ppm.

51247

APTIC NO. 74114

Hyogo Prefectural Government, (Japan) Div. of Environmental Pollution

PRESENT SITUATION OF OFFENSIVE ODOR AND ITS RELATED COUNTERPLAN. (Akushu no genjo to taisaku). Text in Japanese. In: Hyogo Prefectural White Paper on the Environment in 1974, p. 258-268, 1975.

Data on malodor complaints registered in 21 cities in Hyogo Prefecture are compiled. The number of malodor complaints registered were 828 in 1972 and 786 in 1973, the latter being 10 times that recorded in 1968. Concentrations of ammonia, methyl mercaptan, hydrogen sulfide, methyl sulfide, and trimethylamine were measured at animal farms, bone-meat plants, refuse treatment plants, sewage treatment plants, kraft pulp mills, rayon mills, and fish canneries during the period July to September 1973. Malodor control standards (ppm) for the general region are: 1 for NH₃, 0.002 for methyl mercaptan, 0.02 for H₂S, 0.01 for methyl sulfide, and 0.005 for trimethylamine.

51248

APTIC NO. 74244

General Dynamics, San Diego, Calif., Convair Aerospace Div.

IMPROVED INTEGRATED REAL-TIME CONTAMINATION MONITOR. National Aeronautics and Space Administration Contract NAS 8-28987, Rept. CASD-NAS-74-009, 58p., Feb. 1974. 4 refs.

NTIS: N74-28930

The development of a real-time contamination monitor that utilizes an ultraviolet light source to measure pollutant emissions from spacecraft is described. The integrated module consists of four independent instruments and an experimental active cleaner. The instruments include a quartz crystal microbalance for measuring mass accumulation, a residual gas analyzer to identify the contaminant, a particle size analyzer, and an optical module for measuring the degradation of optical properties.

51249

APTIC NO. 75152

Ecology Audits, Inc., Dallas, Tex. and Kellog (M. W.) Co., Houston, Tex.

SULFUR COMPOUND EMISSIONS OF THE PETROLEUM PRODUCTION INDUSTRY (FINAL REPORT). Environmental Protection Agency Contract 68-02-1308, Task 26-1, Program Element 1AB013, ROAP 21ADE-010, Rept. EPA-650/2-75-030, 169p., Dec. 1974. 3 refs.

NTIS: PB 241261/AS

Sulfur compound emissions from the Permian Basin and the Smackover Formation, two areas that represent about 80% of the sulfur emissions from oil and gas fields in the United States, are reported. Sulfur dioxide emissions from these two areas are estimated to be 664,000 short tons/yr, of which 384,000 short tons/yr are from Claus plant tail gases. Hydrogen sulfide emissions are estimated to be 9000 short tons/yr. The inventory lists the plants studied and tabulates the production of sulfur emissions by counties. (Author abstract modified)

1973

51250

APTIC NO. 73870

Andersson, Gun and Peringe Grennfelt

DETERMINATION OF HEAVY METALS IN FUEL OILS AND AN ESTIMATION OF THE EMISSIONS OF HEAVY METALS FROM OIL COMBUSTION. Swedish Water and Air Pollution Research Lab., Gothenburg (Sweden), Rept. B 138, 19p, Jan. 1973. 11 refs.

Heavy metal concentrations were determined for 37 different fuel oils burned in Sweden and were used along with oil consumption data to estimate emission factors associated with oil combustion. Total emissions in tons/yr during 1971 for vanadium, nickel, iron, manganese, copper, zinc, lead, chromium, cobalt, molybdenum, cadmium, mercury, and arsenic were estimated as 580, 180, 67, 1, 3.9, 10, 10, 0.82, 4.4, 2.4, 0.2, 0.075, and 0.70. Only the vanadium nickel emissions appeared to contribute significantly to the total emission levels in Sweden. Heavy metal content varied greatly between different oils and was usually relatively low in low-sulfur oils.

51251

APTIC NO. 74275

Brown, T. D.

AIR POLLUTION AND ENERGY RESERVES. *Civ. Serv. Rev.*, 46(1):6, 8, 10, 12, 1973.

Air pollution is discussed in relation to conserving energy, with particular reference to Canadian energy usage. A personal inventory of air pollution for a family unit of four people is compiled to illustrate the effects of daily activities on the Canadian air pollution problem. Activities relating to automobile usage, space heating, domestic electricity consumption, and services requiring various fuels are specified in terms of annual average use and the amount of various pollutants produced. The amount of pollution produced from all sources for a family of four is 155,521 lb/yr for carbon dioxide, 1821 lb/yr for carbon monoxide, 564.3 lb/yr for nitrogen oxides, 6986 lb/yr for gaseous sulfur compounds, and 351 lb/yr for particulates and hydrocarbons. Comparisons of the pollution produced from alternative residential heating modes (oil, gas, electric) are presented along with comparisons of pollution resulting from gasoline versus electric powered transportation. Fuel consumption by use category and resulting air pollution is illustrated for the residential/commercial sector, general industry, thermal power, automobiles, and other transportation over the period 1965-1980. Automobiles account for the highest percentage of total air pollution (74.0% in 1970) and are projected to result in an annual increase of 18.2% over the period 1965-1980. Fuel consumption in relation to Canadian fuel reserves and total world reserves is also tabulated.

51252

APTIC NO. 75313

Bulygin, B. M., Y. A. Bulygina, and A. A. Karnishin

STUDY OF POLYURETHANE FOAM THERMAL DECOMPOSITION PRODUCTS. (*Issledovaniye produktov termicheskogo razlozheniya penopolietana*). *Plast. Massy*, vol. 8:49-52, 1973. 5 refs. Translated from Russian. Translation Consultants, Ltd., Arlington, Va., 12p.

The thermal decomposition products of several polyurethane foams were evaluated in experiments employing pyrolysis without admission of air, thermal oxidation with forced delivery of air through the pores of the material, and during free burning. The gaseous decomposition products included: hydrogen cyanide, carbon monoxide, methane, and, in a number of cases, carbon dioxide and hydrogen chloride. Rigid foams liberated more HCN than elastic foams due to their high urethane content. Thermal decomposition during forced air delivery to the material resulted in HCN concentrations 10-15 times higher than those measured during decomposition without air admission. Free burning of polyurethane occupied an intermediate position in terms of HCN generation. Self-extinguishing soft foams were more dangerous, yielding up to 0.06% HCN in comparison to 0.025% for combustible foams.

51253

APTIC NO. 75120

Ditto, F. H., L. T. Gutierrez, T. H. Lewis, and L. J. Rushbrook

WEIGHTED SENSITIVITY ANALYSIS OF EMISSIONS DATA: VOLUME I - BACKGROUND AND THEORY (FINAL REPORT). *International Business Machines Corp., Gaithersburg, Md., Environmental Protection Agency Contract 68-01-0398, Task 1, BOA68-01-0398, Rept. EPA-450/3-74-022-a, 125p., July 1973. 5 refs.*

A weighted sensitivity analysis of emission inventory data that allows users to quantitatively analyze the accuracy requirements of various inventory components to insure an overall acceptable accuracy in the total inventory (at a given confidence level) is presented. Selected numerical analyses are included to illustrate the application of the technique to the Nationwide Emissions Report data at different levels of aggregation. The software developed to implement the weighted sensitivity analysis technique is also documented.

51254

APTIC NO. 75121

Ditto, F. H., L. T. Gutierrez, T. H. Lewis, and L. J. Rushbrook

WEIGHTED SENSITIVITY ANALYSIS OF EMISSIONS DATA: VOLUME II - APPENDIX B. NUMERICAL ANALYSIS. APPENDIX C. EXAMPLE OF APPLIED ANALYSIS (FINAL REPORT). *International Business Machines Corp., Gaithersburg, Md., Environmental Protection Agency Contract 68-01-0398, Rept. EPA-450/3-74-022-b, 152p., July 1973. 4 refs.*

Appendices to a computerized weighted sensitivity analysis of emission inventory data are presented. One appendix contains complete weighted sensitivity analyses of the Nationwide Emissions Reports under three different values of the overall permissible error, and a second applies the weighted sensitivity analysis technique to a concrete air pollution control problem in Virginia. The latter appendix is included to illustrate the versatility and applicability of the technique using a statistical analysis of emission inventory data to design air pollution control activities necessary for attaining and maintaining secondary standards for particulates.

51255

APTIC NO. 75326

Eisenhut, W.

REPORT OF WORK PLACE MEASUREMENTS IN SHED OVER UNLOADING TRACK AT TARIFF UNION COKE WORKS. (*Bericht ueber die Messungen an den Arbeitsplaetzen innerhalb der Loeschgleishalle auf der Kokerei Zollverein*). Feb. 26, 1973. Translated from German. Leo Kanner Associates, Redwood City, Calif., 23p., Jan. 22, 1975.

Measurements of carbon monoxide, hydrogen sulfide, sulfur dioxide, methane, and dust burden were made at various locations over the unloading track of a coke works. The average dust concentration at a car transporting cakes of coke was 14.03 mg/cu m during normal operation, and the average dust concentration in the cabin of the unloading car was 2.76 mg/cu m. Carbon monoxide values in the cabin of the unloading car were between 8-10 ppm, with peak values of 35-40 ppm occurring during transit to the quenching tower in the sliding operation. No CO was measured on the car transporting the cakes of coke. Hydrogen sulfide concentrations at all work places were far below 15 mg/cu m, and SO₂ concentrations were below 13 mg/cu m. Methane concentrations on the side of the coke ramp were between 0.01 and 0.03 vol%; on the oven side the CH₄ concentrations were 0.01-0.1 vol%.

51256

APTIC NO. 73757

Evans, R. S.

HOGGED WOOD AND BARK IN BRITISH COLUMBIA LANDFILLS. *Canadian Forestry Service, Vancouver (British Columbia), Western Forest Products Lab., Rept. VP-X-118, 25p., July 1973. 18 refs.*

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The disposal of hogged wood and bark in engineered landfills as an alternative to incineration is discussed. Hogged wood and bark exhibit low density, good packing characteristics, and low cost, making them useful landfill materials. Specific uses for these materials include highway underfill over peat bogs, commercial improvement fill on bog land, and intermediate-daily dressing on municipal sanitary landfills. Minimizing groundwater leaching by proper site selection or design is a major pollution control requirement. Research on the toxicity of leachates is lacking, though there is indirect evidence that leachates may be toxic to fish. Structural decay appears to be inconsequential under anaerobic burial conditions. Spontaneous combustion and methane gas production are not considered to be of serious concern in properly engineered and well-sealed fills. (Author abstract modified)

51257

APTIC NO. 75077

Greifer, Bernard and John K. Taylor (eds.)

SURVEY OF VARIOUS APPROACHES TO THE CHEMICAL ANALYSIS OF ENVIRONMENTALLY IMPORTANT MATERIALS (FINAL REPORT). National Bureau of Standards, Washington, D. C., Analytical Chemistry Div., Environmental Protection Agency Contract NBS-EPA-IAG 0215(D), Proj. 3105440, Rept. NBSIR 73-209, 237p., July 1973. 587 refs.

NTIS: COM-74-10469

Methods for the elemental trace analysis (less than 100 ppm) of mercury, beryllium, cadmium, arsenic, vanadium, manganese, nickel, antimony, chromium, zinc, copper, lead, selenium, boron, fluorine, lithium, silver, tin, iron, strontium, sodium, potassium, calcium, silicon, magnesium, uranium, and thorium in such matrices as fly ash, coal, oil, ores, minerals, metals, alloys, organometallics, incinerator particulates, slurry streams, and feeds to and from sedimentation processes are summarized in terms of capabilities and costs. The methods include: various nuclear techniques such as neutron activation analysis, spark source mass spectrometry, X-ray fluorescence, electron microprobe spectrometry, atomic absorption spectrometry, absorption spectrophotometry, atomic emission spectrometry, voltammetry (polarography), and potentiometry (ion-selective electrodes).

51258

APTIC NO. 74130

Hayakawa, Kazuya and Yukio Sano

URBAN AIR POLLUTION (FIXED EMISSION SOURCES AND THERMAL SOURCE CONVERSION). (Toshi taiki osen ni tsuite (kotei hasseigen to netsu tankan)). Text in Japanese. Preprint, Japan Inst. of Architecture, p. 211-212, 1973. (Presented at the Japan Institute of Architecture Annual Meeting, Oct. 1973.)

The reduction in sulfur dioxide emission is resulting from thermal source conversion was calculated from data of total emissions from fixed sources such as factories and business facilities. The SO₂ emissions were high in central Tokyo and the eastern and western industrial areas. The high emissions in central Tokyo during the winter were mainly due to building heating systems. Total emissions were estimated to be remarkably reduced by using low-sulfur heavy oil, natural gas, or electric power as energy sources. Strict regulation is necessary even when low-sulfur heavy oil is used as major energy source because of the large consumption associated with economic growth. Electric power is an ideal energy source, but pollution from power plants creates another problem.

51259

APTIC NO. 74207

Hayakawa, Kazuya and Mitsutoshi Goto

GEOGRAPHICAL EVALUATION OF URBAN AIR POLLUTION - MESH DATA ANALYSIS. (Toshi taiki osen no chiiki hyoka ni tsuite). Text in Japanese. Preprint, Japan Inst. of Architecture, p. 213-214, 1973. (Presented at the Japan Institute of Architecture Annual Meeting, Oct. 1973.)

A mesh data analysis of the geographical distribution of air pollution in Tokyo was performed. Data obtained in June 1970 for the total emissions and the relative contributions from factories, building heating systems, and automobiles were, respectively: carbon monoxide, 1657.6/day (11.6/day, 2.5/day, and 1643.5/day) hydrocarbons, 195.7/day (11.4/day, 1.4/day, and 183.9/day) nitrogen oxides, 201.9/day (98.3/day, 15.2/day, and 88.4/day) particulates, 66.8/day (48.8/day, 13.5/day, and 4.5/day) and sulfur oxides, 370.6/day (284.2/day, 86.3/day and 0/day). High CO concentrations appeared in central Tokyo areas including Ikebukuro, Shinjuku, and Shibuya; while high levels of SO_x appeared in the Shinagawa, Eto and Arakawa areas.

51260

APTIC NO. 75396

Kuehn, W. and H. Sontheimer

SEVERAL INVESTIGATIONS ON ACTIVATED CHAR-COAL FOR THE DETERMINATION OF ORGANIC CHLORO-COMPOUNDS. (Einige Untersuchungen zur Bestimmung von organischen Chlorverbindungen auf Aktivkohlen). Vom Wasser, vol. 41:65-79, 1973. 31 refs. Translated from German, 19p.

A method for the determination of organic chlorine compounds in water media is described, with particular reference to its application at water treatment plants. The method involves enriching the chlorine compounds on activated carbon by a temperature-programmed pyrohydrolysis. An ion-specific chloride electrode is used for making the final measurement. Measurements of the loadings of different activated carbons at a pilot water treatment plant are presented. (Author abstract modified)

51261

APTIC NO. 75140

Sindermann, F.

OPTIMUM WORKING FLUIDS FOR AUTOMOTIVE RANKINE ENGINES. VOLUME IV - ENGINE DESIGN OPTIMIZATION. Sunstrand Aviation, Rockford, Ill., Environmental Protection Agency Contract 68-04-0030, Subcontract E0030-1, Rept. APTD-1566, 107p., June 1973. 1 ref.

NTIS: PB 239250/AS

Optimum system designs were determined for two turbine engines operating on a Rankine working fluid consisting of 60 mol% pentafluorobenzene and 40 mol% hexafluorobenzene and for one reciprocating engine operating on a mixture of 65 mol% water and 35 mol% 2-methylpyridine using a Rankine cycle engine optimization computer program. Optimized weighting factors (efficiency versus weight) of 0.5 and 0.97 were obtained for the two turbine engines; the reciprocating engine displayed a weighting factor of 0.5. The regenerator efficiencies were 93, 95, and 87%, respectively. Both candidate working fluids appeared to be appropriate for automotive size engine.

51262

APTIC NO. 74103

Kyoto City (Japan), Dept. of Environmental Pollution Countermeasures

ON SURVEY RESULTS ON POLLUTION AROUND KIYOMIZU TEMPLE, GOJOZAKA. (Kiyomizudera, Gojozaka shuhen no kogai to chosa kekka ni tsuite). Text in Japanese. In: Kyoto-shi ni Okeru Kogai Gyosei no Ayumi: Kogai Kankei Koho Shiryoshu, p. 25-31, Dec. 14, 1973.

An 8-hour daytime survey near Kiyomizu Temple and Gojozaka in Kyoto City, Japan, was taken on Friday, Nov. 23, 1973 (a holiday), to determine vehicular traffic noise, atmospheric carbon monoxide concentrations in the streets, and traffic pattern conditions to Gojozaka. Vehicular traffic noise levels were monitored at four locations. Average noise levels ranged from 65-73 phons, about 1-4 phons lower than levels observed on Sunday, April 23, 1972. Carbon monoxide concentrations were determined at 14 locations by collecting con-

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tinuously in sampling bags during 1-hour intervals, and analyzing for carbon monoxide by infrared analyzer. Average hourly carbon monoxide concentrations ranged from 2.8-17.0 ppm, with the average at 8.2 ppm. These values were lower on the whole than the April 1972 values. A total of 2689 motor vehicles were included in the traffic survey. The highest traffic flow occurred between 3-4 pm (414 vehicles); the lowest, from 9-10 am (260 vehicles). Taxis comprised 45.3% of the traffic, followed by passenger cars (31.0%), and buses (7.5%). Vehicles with Kyoto license plates comprised 71.6% of the traffic, of which 62.8% were taxis.

51263

APTIC NO. 75401

REPORT TO THE ATTENTION OF THE RECEIPIENTS OF EUR REPORT 5005 F. D: STUDY OF THE SOURCES AND QUANTITIES OF SOLID, LIQUID AND GASEOUS RESIDUES AND WASTES FROM HEAVY METALS DISCHARGED INTO THE ENVIRONMENT IN WEST GERMANY AND FRANCE.

(Communication a l'intention des destinataires du rapport dur 5005 f, d: etude sur les sources et les volumes de residus et dechets solides, liquides et gazeux de metaux lourds rejetes dans le milieu ambiant en republique federale d'Allemagne et en France). In: *Environnement et Qualite de la Vie*, no. 1, May 1973. 1 ref. Translated from French, 8p.

Data on consumption, use, and environmental loss of mercury compounds are provided for France and West Germany, with particular reference to the electrolysis industry. Losses of mercury compounds during 1972 attributable to French chlorine manufacturers (electrolysis plants) amounted to 19 tons of atmospheric emissions. The figure for the German electrolysis industry was 25 tons of airborne mercury emissions. Electrochemical operations in France during 1972 accounted for the purchase or use of 175 tons of mercury out of a total national usage of 365 tons.

1972

51264

APTIC NO. 75307

Pollak, Kazimierz and Janusz Liberacki

DRY COKE QUENCHING, A METHOD FOR IMPROVING THE QUALITY OF THE COKE AND PROTECTING THE ENVIRONMENT, PART II. (Suche gaszenie koksu jako sposob poprawy jakosci koksu i ochrony srodowiska). *Koks, Smola, Gaz*, no. 11, 1972 (?). 11 refs. Translated from Polish. Leo Kanner Associates, Redwood City, Calif., 15p., Jan. 1975.

The engineering and pollution aspects of dry coke quenching are considered and compared to the more conventional wet coke quenching procedure. Dry quenching reduces coking time by about 30 min and saves about 50 tons of fuel per year in the metallurgical plant production cycle. The elimination of coal burning for steam production in the dry quenching operation eliminates combustion product emissions and reduces sulfate emissions.

1971

51265

APTIC NO. 71520

Giordano, Giorgio

CONTROL SYSTEMS OF GAS TURBINE AND HELPER STEAM TURBINE UNITS. *Congres International Des Machines A Combustion, Int. Congr. Combust. Engines, Proc. Conf., 9th, Stockholm, Sweden, 1971*, p. 1-21.

Control systems for combined cycle gas turbine and steam turbine plants are discussed, with particular emphasis on the heat recovery applications of such installations. Combined steam-power plants generally consist of the following components: a gas turbine, a boiler, a steam turbine, and a driven machine

AIR POLLUTION ABSTRACTS, OCTOBER 1975

(electric generator, compressor, pump). Problems involving the matching of control systems for the gas turbine and steam turbine portions of such plants are reviewed, with examples given for combined electrical power generation and steam production facilities and for an air compression station in an ammonia plant.

51266

APTIC NO. 75400

HISTORY OF THE LA TAUPE POWER PLANT. (La centrale de la taupe: historique). 1971 (?). Translated from French, 27p.

The installation of an Ignifluid furnace on a 35 ton/hr Cail-Steinmuller grid boiler at the La Taupe power plant is described. The unit's guaranteed minimum efficiency is 82%. Operation over 7884 hr demonstrates the consumption of 19,843 tons of washed fines with 13% ash, 7837 tons of crude fines with 32% ash, and 1452 tons of granulated coal with 10% ash, with an energy production of 44,084 mW/hr. The operating characteristics of the installation as well as the efficiency of the dust collection system are currently being studied.

1970

51267

APTIC NO. 75398

Mortier, A.

ALSTHOM FOR THE O.N.E. ROCHES NOIRES POWER PLANT, CASABLANCA REPORT ON BOILER ACCEPTANCE TESTS. (ALSTHOM Pour O.N.E. centrale des roches noires, casablanca compte-rendu des essais de reception chaudières). Preprint, Babcock-Atlantique, Paris (France), Testing and Shipping Div., Dec. 17, 1970. Translated from French, 27p.

Data from boiler acceptance tests at the Roches Noires thermal power plant are presented. Levels of carbon dioxide, oxygen, and carbon monoxide in the boiler outlet smoke were 11.2-12.90%, 2.80-5.60%, and 0%, respectively, during oil firing and 10.0-15.27%, 4.26-9.70%, and 0%, respectively, during coal firing. The volume of smoke ranged from 106,000-119,500 cu nm/hr with a dust concentration of from 0.212-0.910 g/cu nm. Three particular boiler tested met all guarantees.

1967

51268

APTIC NO. 75308

Blanc-Garin, G. and H. Seners

FIFTY-FIVE TONS/HOUR IGNIFLUID FURNACE BOILER. (Chaudiere 55 tonnes/heure a foyer ignifluid). Preprint, Babcock and Wilcox Co., Paris (France), 1967. Translated from French. Translation Consultants, Ltd., Arlington, Va., 5p.

A 55 ton/hr coal-fired ignifluid furnace boiler is described along operating and availability experience. The furnace employs primary and secondary air injection and recirculation; cyclones are used to control smoke emissions. Operation over a 1-year period resulted in a down-time percentage of 2.14% overall, with 0.3% being attributable to the grate alone. Boiler shut down was associated with replacement of soot reinjection tubes, repairs to the clinker dump chute, replacement of the clinker chute guards, flushing repairs, blower belt replacement, coal handling system repairs, replacement of the grate tumbler feed bearings, and modification of the grate.

CONTROL METHODS

1975

51269

APTIC NO. 75287

Awad, M. B. and G. S. P. Castle

THE EFFICIENCY OF ELECTROSTATIC PRECIPITATORS UNDER CONDITIONS OF CORONA QUENCHING. *Environmental Protection Agency, Washington, D. C., Office of Research and Development, Symp. Electrostat. Precipitators Control Fine Part., Research Triangle Park, N. C., 1975, p. 393-408, EPA-650/2-75-016. 8 refs.*

NTIS: PB 240440/AS

The efficiency of electrostatic precipitators under conditions of corona quenching was investigated during experiments conducted under both positive and negative corona with aerosols having specific surfaces in the range of 0-44 sq m/cu m. Collection efficiency decreased as the specific surface area increased for low values of corona current densities. The charge per particle decreased as the particle concentration increased and became far below the normal charge attainable. The increase in collection field was more than counteracted by the large reduction in particle charge. For higher values of initial corona current densities, the efficiency either increased or remained constant as the particle-specific surface area increased, despite major reductions in measured corona current. The reduction in charge per particle with increasing particle concentration was apparently offset by the increase in collection field strength. The major parameter affecting collection efficiency appeared to be the ratio of the initial corona current density to the specific surface of the particles. (Author abstract modified)

51270

APTIC NO. 75285

Bakke, Even

WET ELECTROSTATIC PRECIPITATORS FOR CONTROL OF SUB-MICRON PARTICLES. *Environmental Protection Agency, Washington, D. C., Office of Research and Development, Symp. Electrostat. Precipitators Control Fine Part., Research Triangle Park, N. C., 1975, p. 349-369, EPA-650/2-75-016. 6 refs.*

NTIS: PB 240440/AS

The operation and applications of continuously sprayed, horizontal flow, parallel plate, solid discharge electrode wet electrostatic precipitators are reviewed, with particular emphasis on collection efficiencies in the submicron range. Optimization of wet precipitator performance requires a uniform velocity profile across the inlet section, which is accomplished by installing U-shaped baffle members in the inlet. After passing through the sections of U-shaped baffles, the dirty gas stream enters the first electrostatic field, and water sprays located above the electrostatic field sections introduce evenly distributed water droplets to the gas stream. The particulates and water droplets pick up charges and migrate to the collecting plates, with the collected water droplets forming a continuous downward-flowing film over the collecting plates to keep them clean. Submicron particulate collection efficiencies of over 98% are reported for applications involving emissions from anode baking furnaces, coke ovens, and potlines.

51271

APTIC NO. 72136

Bohn, Thomas

HYDROGEN AS ENERGY CARRIER OF THE FUTURE. (*Wasserstoff als Energieträger der Zukunft*). Text in German. *Umwelt (Duesseldorf)*, 5(2):21-22, 1975.

The lower heating value of the liquid hydrogen is 28,896 kcal/kg, that of gasoline 10,022 kcal/kg (or 2049 kcal/l for hydrogen and 7617 kcal/l for gasoline). The transport of gaseous hydrogen in pipes is feasible with present technical

knowledge, however, it is about 23% more expensive than the transport of methane. Liquid hydrogen is even more expensive because liquefaction alone costs \$5/gigacal. It is easily flammable. As fuel it will be used in special cases only, such as perhaps for jumbo jets. In industry the market for hydrogen would be large. For example, for the direct reduction of iron 30 billion cu m/a could be used and for the production of ammonia about four billion cu m/a. Recent studies have concentrated on the production of inexpensive hydrogen through thermolytic water cracking with the aid of nuclear process heat. The total activity in this field in the Federal Republic of Germany is still small with total expenditures not more than \$0.33 million per annum.

51272

APTIC NO. 75368

Chehaske, John T. and John R. Cline

TESTING OF A MOLECULAR SIEVE USED TO CONTROL MERCURY EMISSION FROM A CHLOR-ALKALI PLANT, VOLUME II - APPENDICES (FINAL REPORT). *Engineering-Science, Inc., McLean, Va., Air Pollution Control Dept., Environmental Protection Agency Contract 68-02-1406, Task 3, Program Element 1AB015, ROAP 21AFA-106, Rept. EPA-650/2-75-026-b, 229p., March 1975. 7 refs.*

NTIS: PB 242006/AS

Results from tests of a molecular sieve used to control mercury emissions from a mercury-cell chlor-alkali plant are presented. The molecular sieve used was a Union Carbide PuraSiv adsorbent unit. Adsorber inlet and outlet streams were sampled simultaneously during five consecutive 24-hour adsorption cycles (eight sampling runs per cycle), and inlet mercury concentrations were stable at 6-10 mg/normal cu m. Outlet mercury concentrations of 0.5 and 3.5 mg/normal cu m were approached at the beginning and end of each adsorption cycle, respectively. This occurrence was due to the PuraSiv unit's operation at nearly 150% of design capacity (49.6 normal cu m/min). The estimated outlet mercury concentration from the PuraSiv unit operating at design capacity was 2.0 micrograms/normal cu m, representing a 99.9% collection efficiency.

51273

APTIC NO. 75211

Chervenak, M. C., P. Maruhn, and G. Nongbri

DEMETALLIZATION OF HEAVY RESIDUAL OILS - PHASE II. *Hydrocarbon Research, Inc., Trenton, N. J., Environmental Protection Agency Contract 68-02-0293, Program Element 1AB013, ROAP 21ADD-050, Rept. EPA-650/2-73-041-a, 94p., Feb. 1975.*

NTIS: PB 241 901/AS

A low cost demetallization catalyst for heavy residual oils was produced on a commercial scale and economically evaluated for vacuum residua containing different levels of contaminant metals. Granular 20 by 50 mesh bauxite impregnated with 1.0 wt% molybdenum proved to be better than 0.5 wt% molybdenum and equal to a 2.0 wt% molybdenum preparation in terms of demetallization and catalyst lifetime when used to demetallize Tia Juana vacuum residuum. Commercial technology and facilities are presently available to at least one major catalyst manufacturer to produce this catalyst on a commercial scale. A process economics evaluation using the commercial production catalyst in a demetallization stage followed by a desulfurization stage indicated that 0.5 wt% sulfur fuel oil can be produced from Tia Juana vacuum residuum in a United States Gulf Coast plant of 20,000 barrels per stream day capacity at \$1.63/barrel (including capital charges of 25% of investment) versus \$1.69 for unpromoted activated bauxite. The investment cost for the promoted commercial catalyst was \$17.07 MM versus \$19.44 MM for unpromoted activated bauxite. The comparable costs for Gach Saran vacuum residuum were \$1.41/barrel versus \$1.47 and \$16.06 MM versus \$17.22 MM. (Author conclusions modified)

51274

APTIC NO. 75378

Cirillo, R. R., J. F. Tschanz, and J. E. Camaioni

AN EVALUATION OF STRATEGIES FOR AIRPORT AIR POLLUTION CONTROL (FINAL REPORT). Argonne National Lab., Ill., Energy and Environmental Systems Div., Office of Air and Waste Management Interagency Agreement EPA-IAG-095(D), Rept. EPA-450/3-75-052, 181p., Jan. 1975. 31 refs.

NTIS: PB 242289/AS

Field tests and a Gaussian plume model of pollutant dispersion were used to evaluate strategies for airport air pollutant control. The use of engine emission standards was the most effective strategy for reducing aircraft emissions. Towing and fleet mix control provided substantial carbon monoxide and hydrocarbon reductions, but fleet mix resulted in a significant increase in nitrogen oxide emissions. Engine shutdown and capacity control provided only small air quality improvements. (Author abstract modified)

51275

APTIC NO. 75112

Cooper, Douglas W.

PENTAPURE IMPINGER EVALUATION. GCA Corp., Bedford, Mass., Environmental Protection Agency Contract 68-02-1487, Program Element 1AB012, ROAP 21ADL-004, Rept. EPA-650/2-75-024-a, GCA-TR-75-5-G(1), 66p., March 1975. 8 refs.

NTIS: PB 240397/AS

A Pentapure impinger-type scrubber was field tested at a gray iron foundry to determine the device's collection efficiency for fine particulates (less than 3 micron in diameter). The total mass efficiency of the scrubber was 10.0 + or - 2.5% for fine dust of about 0.5 micron in diameter exiting from a spray cooling chamber. The particle aerodynamic diameter for which an efficiency of 50% could be attained was estimated at between 2 and 4 micron. The pressure drop across the Pentapure scrubber was 6 in. water. The measured efficiencies corresponded to those expected from venturi scrubbers having somewhat less pressure drop. The Pentapure scrubber did not prove to be an efficient fine particle collector. (Author abstract modified)

51276

APTIC NO. 75117

Dennis, Richard and John Wilder

FABRIC FILTER CLEANING STUDIES (FINAL REPORT). GCA Technology Div., Bedford, Mass., Environmental Protection Agency Contract 68-02-0268, Program Element 1AB012, ROAP 21ADJ-049, Rept. EPA-650/2-75-009, GCA-TR-74-6-G, 438p., Jan. 1975. 35 refs.

NTIS: PB 240372/AS

Fabric filter cleaning mechanisms were studied in a pilot plant system designed to operate as a single - or multiple-bag unit for the investigation of cleaning by mechanical shaking, pulse jet air, and reverse flow air. Evaluations were performed on four woven bag types (cotton and dacron) and two felt bag types (wool and dacron) using resuspended fly ash and talc dusts. An analysis of cleaning by both mechanical shaking and pulse jet air indicated that the tensile force generated by bag acceleration was the main cause of dust removal; aerodynamic re-entrainment played only a minor role. Residual fabric drag, fabric holding capacity, and dust penetration characteristics were predictable in terms of such cleaning parameters as shaking frequency, amplitude, pulse jet pressure, and rate of pressure rise. Based on an inlet concentration of 3-10 grains/cu ft, effluent concentrations for the mechanically shaken, woven fabrics ranged from 0.0000001 to 0.001 grains/cu ft in contrast to 0.001-0.01 grains/cu ft for felted media cleaned by pulse jet air. Effluent concentrations for both systems decreased significantly as the filtration progressed. (Author abstract modified)

51277

APTIC NO. 75201

Dismukes, Edward B.

CONDITIONING OF FLY ASH WITH AMMONIA. Environmental Protection Agency, Washington, D. C., Office of Research and Development, Symp. Electrostat. Precipitators Control Fine Part., Research Triangle Park, N. C., 1975, p. 257-287, EPA-650/2-75-016. 22 refs.

NTIS: PB 240440/AS

Field tests at Tennessee Valley Authority coal-fired power plants involving the effect of flue gas conditioning with ammonia on the fly ash collection efficiency of electrostatic precipitators are described, with particular emphasis on the mechanisms of collection enhancement. Ammonia conditioning appears to improve the efficiency of fly ash precipitation through two mechanisms. The first consists of a space-charge effect, and the second involves an increase in the cohesiveness of fly ash. The first occurs with fly ash having low to moderately high resistivities, while the second mechanism is observed only with low-resistivity fly ash. Evidence of each mechanism is observed only under circumstances where the properties of the coal and the fly ash as well as the temperature of the flue gas permit significant concentrations of sulfur trioxide (2-11 ppm) to occur in the off gas. The reaction of ammonia with SO₃ to produce ammonium sulfate or ammonium bisulfate appears to be a key event in the occurrence of either conditioning process. (Author conclusions modified)

51278

APTIC NO. 75202

Dismukes, Edward B.

CONDITIONING OF FLY ASH WITH SULFAMIC ACID. Environmental Protection Agency, Washington, D. C., Office of Research and Development, Symp. Electrostat. Precipitators Control Fine Part., Research Triangle Park, N. C., 1975, p. 289-314, EPA-650/2-75-016. 20 refs.

NTIS: PB 240440/AS

Pilot plant and field tests of sulfamic acid flue gas conditioning for the reduction of fly ash resistivity and increased electrostatic precipitator collection efficiency are reviewed. Sulfamic acid appears to be a worthy substitute for sulfur trioxide as a flue gas conditioning agent, as evidenced by increases in collection efficiency obtained at various coal-burning plants with high-resistivity fly ash problems. The primary advantages of sulfamic acid are ease in handling and freedom from hazard; the high cost of the chemical is its main disadvantage. The mechanisms by which sulfamic acid acts as a conditioning agent are not clearly established.

51279

APTIC NO. 75343

Dykema, Owen W.

ANALYSIS OF TEST DATA FOR NOX CONTROL IN GAS- AND OIL-FIRED UTILITY BOILERS (FINAL REPORT). Aerospace Corp., El Segundo, Calif., Urban Programs Div., Environmental Protection Agency Grant R-802366, Program Element 1AB014, ROAP 21ADG-089, Rept. EPA-650/2-012, ATR-75(7487)-1, 265p., Jan. 1975. 7 refs.

NTIS: PB 241918/AS

Data on emissions, operating conditions, and boiler configurations for full-scale, multiple-burner electric utility boilers using natural gas and low-sulfur fuel oils are analyzed to evaluate the effects of combustion modifications on nitrogen oxide emissions. All of the effects of combustion modification on NOx emissions appear roughly explainable by the equivalent air-fuel ratio, temperature, and time history of the reactants as they flow through the aerodynamic mixing and reaction zones in the boiler and contact the boiler walls. Reduction of combustion air temperature reduces NOx emissions, though this technique becomes increasingly ineffective at lower temperatures. Significant plant efficiency losses can also result. Increasing the cooling rate in the radiant section of the boiler has essentially the same effect as that of reducing the com-

bustion air temperature, except that the heat is always rejected to the working medium. Nitrogen oxide reductions by two-stage combustion are generally limited by the NO_x generated when the remaining excess air is added. Taking burners out of service produces the same effect as staged combustion. Generally, initial NO_x reductions to 30-50% of uncontrolled levels are easily accomplished with combustion modifications; further reductions become increasingly more difficult. (Author summary modified)

51280

APTIC NO. 75327

Eisenhut, Werner

MEASURES TO REDUCE THE EMISSIONS FROM COKING PLANTS. (Massnahmen zur Emissionsverminderung auf Kokereien). 13 refs. Translated from German. Leo Kanner Associates, Redwood City, Calif., 29p., Jan. 1975.

Measures for reducing particulate and gaseous emissions from coking plants are reviewed. Typical abatement methods include: the scrubbing of exhaust gases, the design of quenching towers so that the exit speed of the quenching cloud is as low as possible, the wetting of coking coal piles exposed to the wind, the use of mechanical collectors (cyclones) and wet scrubbers for the removal of dust from screening plants, the desulfurization of coke oven gas by methods such as the ammonia/hydrogen sulfide washing cycle, the use of wet dust collector/charging cars, the employment of staged charging procedures, the installation of mechanical cleaning devices on pushers and coke transport cars, the installation of hoods and exhaust systems on coke-cake transport cars, the use of dry quenching methods, and the combining of the hopper car with the quenching vessel.

51281

APTIC NO. 75123

Feazel, Charles E. (ed.)

SYMPOSIUM ON ELECTROSTATIC PRECIPITATORS FOR THE CONTROL OF FINE PARTICLES. Southern Research Inst., Birmingham, Ala., Environmental Protection Agency Contract 68-02-1308, Task 14, Program Element 1AB012, Proj. 3294-1, Rept. SORI-EAS-75-056, ROAP 21ADL-034, EPA-650/2-75-016, 500p., Jan. 1975, 75 refs. (Symposium reports processed individually under Aptic 75188-75210.)

NTIS: PB 240440

Recent advances in electrostatic precipitator technology are described, with particular emphasis on fine particulate (less than 1-2 micron) control. Topics discussed include: fractional collection efficiency measurements; techniques for the sizing and design of electrostatic precipitators; mathematical models of electrostatic precipitator performance; methods for combating the problem of collecting high-resistivity fly ash, including flue gas conditioning and variation of flue gas temperature; corona quenching by particle space charge; charged droplet scrubbers; and wet electrostatic precipitators.

51282

APTIC NO. 75195

Frisch, N. W. and D. W. Coy

SPECIFYING ELECTROSTATIC PRECIPITATORS FOR HIGH RELIABILITY. Environmental Protection Agency, Washington, D. C., Office of Research and Development, Symp. Electrostat. Precipitators Control Fine Part., Research Triangle Park, N. C., 1975, p. 131-157, EPA-650/2-75-016, 5 refs.

NTIS: PB 240440/AS

The design of electrostatic precipitators for high reliability is discussed. Typical fuel analyses are insufficient for sizing a precipitator to reliably treat a large proportion of the fuel population; the use of a large number (over 30) of individual fuel samples, either for individual sizing or for the estimation of a parent population that is representative of the fuel samples, is a more reliable approach. It is also important to incorporate sufficient redundancy into the precipitator design to permit sustained operation under conditions of electrical sec-

tion failure and the like. Distribution effects, such as those representing gas velocity, gas temperature, and dust concentration, can also be significant in reducing the precipitator efficiency; and known methods for adequately compensating for such effects should be applied. (Author conclusions modified)

51283

APTIC NO. 73775

Fujimura, Mitsuru, Toshitami Ro, and Yoshikazu Hashimoto

SIZE DISTRIBUTION MEASUREMENT OF ATMOSPHERIC SUSPENDED DUST BY ANDERSEN SAMPLER, PART 1, SIZE DISTRIBUTION BEFORE AND AFTER AIR CONDITIONING FILTERS.

(Andasen sanpura ni yoru fuju ryushi no ryudo bunpu sokutei, 1, kucho siruta zengo no ryudo bunpu). Text Japanese. Preprint, Japan Chemical Society, Tokyo, p. 812, 1975. (Presented at the Japan Chemical Society Spring Term Annual Meeting, 32nd, Tokyo, Japan, April 1-4, 1975, Paper 2025.)

The size and elemental distribution of suspended dust are determined by an Andersen sampler and neutron activation analysis. Air samples were collected with and without preliminary filters used in an air conditioner. The air sample without the preliminary filters gave two peaks on the size distribution plots versus dust weight, and one of the peaks was located at the size distribution of 4 micron and its concentration was 40 micrograms/cu m air. This peak, attributed to aluminum, manganese, and iron particles, disappeared from the air sample with preliminary filtration. When an activated carbon filter was used in addition to the preliminary filters, this filter combination removed most of the particles sized greater than 2 micron; however, it could not remove smaller particles such as zinc and antimony.

51284

APTIC NO. 73703

Gibbons, E. F., A. H. Meitzler, L. R. Foote, P. J. Zacmanidis, and G. L. Beaudoin

AUTOMOTIVE EXHAUST SENSORS USING TITANIA CERAMIC. Preprint, Society of Automotive Engineers, Inc., Warrendale, Pa., 12p., 1975, 22 refs. (Presented at the Society of Automotive Engineers, Automotive Engineering Congress and Exposition, Detroit, Mich., Feb. 24-28, 1975, Paper 750224.)

The design and performance characteristics of titanium dioxide sensors for use as air/fuel ratio indicators in automotive exhaust emission control systems employing catalytic conversion are described. The resistivity of TiO₂ ceramic depends on the partial pressure of oxygen in the atmosphere surrounding the ceramic. A functional relationship exists between the partial pressure of oxygen in the equilibrated exhaust gas and the air/fuel ratio operating point of the internal combustion engine; thus the resistance of a TiO₂ sensor, when temperature controlled, can be used to determine quantitatively the air/fuel ratio. Such sensors appear to work particularly well in the region of rich stoichiometry where air/fuel ratio control is desirable for engine/catalyst systems designed to meet low nitrogen oxide emission levels. Dynamometer tests with catalyst controlled engines utilizing TiO₂ sensors in feedback loops show improved NO_x conversion efficiency for noble metal catalysts as well as reduced fluctuations in carbon monoxide concentrations.

51285

APTIC NO. 74187

Gijbels, Peter

APPLICATION OF THE CDC-IDC CYCLE TO EXPLOSION AND COMBUSTION ENGINES (PATENTED SYSTEM). (L'application du cycle de travail CDC-IDC aux moteurs a explosion et combustion). (système breveté). Text in French. Ingenieur, no. 31, 32, 34, 36, Jan. 1975.

The economical and environmental advantages of the combined patented CDC-IDC cycle (Combustion During Compression and Injection During Combustion) are presented. In the

CDC cycle, compression starts first after the intake valve is closed, and the combustion of the gaseous mixtures starts at around 45 deg before the top dead center of the piston and it is completed when the compression is. The combined cycle results in a substantial reduction of the radiation losses and heat losses due to exhaust gases which are at rather low temperature. The fuel consumption is reduced considerably, which entails a corresponding reduction in the harmful emissions. The new cycle prevents the formation of unburnt hydrocarbons and nitrogen oxides due to the low temperature, and minimizes the carbon monoxide formation due to the relatively high air-excess coefficient. Lead emissions are eliminated as this cycle requires unleaded gasoline.

51286

APTIC NO. 73901

Hasegawa, Shigeo

SULFUR REMOVAL IN TOYAMA SHINKO NO. 1 UNIT. (Toyama Shinko karyoku ichigoki no haisen datsuryu sochi). Text in Japanese. Karyoku Genshiryoku Hatsuden (Therm. Nucl. Power), 26(1):59-70, Jan. 1975.

A Chiyoda Thorobred 101 desulfurization unit has been installed at the Toyama Shinko Power Station whose boiler emits 150,000 N cu m/hr flue gas and half of the emitted flue gas is treated by the desulfurization unit giving more than 90% desulfurization efficiency. The flue gas is first water-cooled to 50 to 60 C at a cooling tower and diluted sulfuric acid solution (2.35 wt%) is sprayed countercurrently with the cooled flue gas to absorb sulfur dioxide at an absorption-oxidation tower. The hydrogen sulfite produced is oxidized to sulfuric acid under the presence of an iron catalyst. The iron catalyst is added to the absorbing solution (diluted sulfuric acid) in the form of ferrous sulfate and the absorbing solution is also saturated with oxygen. Therefore absorption of SO₂ and oxidation of hydrogen sulfite are achieved simultaneously in the absorption-oxidation tower. Increased sulfuric acid concentration in the absorption solution decreases the desulfurization efficiency. When the sulfuric acid concentration was increased to 3.5 wt%, the desulfurization efficiency dropped to 70% to 85%. Therefore, the sulfuric acid in the absorbing solution is kept between 2.0 to 2.5 wt%, and the excess acid is removed from the solution by reacting with calcium carbonate slurry to form calcium sulfate gypsum whose water contents are separated by a centrifugal separator and returned to the absorption-oxidation tower. No discharging wastewater is made and the system is a completely closed one. Up to 70% of the soot and dust in the flue gas can be removed, but no denitrification is effected by this desulfurization unit.

51287

APTIC NO. 73711

Heywood, John B.

COMBUSTION MODELLING IN AUTOMOTIVE ENGINES. Preprint, Massachusetts Inst. of Tech., Cambridge, 13p., 1975 (?). 12 refs.

The role of combustion modeling in achieving exhaust emission reductions and fuel economy gains from automobile engines is discussed. Such modeling is particularly useful in coupling information on the kinetic mechanism responsible for nitric oxide formation with the thermodynamics of the burnt gases during the combustion process in spark-ignition engines to quantify the trade-off between engine performance and emissions. Combustion modeling is also useful for defining the complex sequence of processes that occurs during the combustion of a fuel spray injected into the engine cylinder, as in stratified charge or diesel engines. These two engine types probably offer the best fuel economy for a given emission level. (Author abstract modified)

51288

APTIC NO. 73931

Hirose, H. and S. Yoshimura

INTERNAL COMBUSTION ENGINE WITH EXHAUST GAS CLEANING APPARATUS. (Haiki gasu joka sochi oyusuru nainen kikan). Text in Japanese. (Toyo Industrial Co., Ltd., Hiroshima (Japan)) Japan. Pat. Sho 50-212. 8p., Jan. 7, 1975. (Appl. Dec. 30, 1970, 5 claims).

Devices for internal combustion engines equipped with exhaust gas cleaning systems such as thermal reactors, exhaust gas recirculation, and catalytic reactors are designed to reduce their hydrocarbons, carbon monoxide, and nitrogen oxides emission during the engine warm-up period. One device keeps the engine idling at 2500 rpm which produces lower emission levels owing to a good fuel mixture within the cylinders and facilitates the reaching of operational temperature for the gas cleaning system. The second device is for bypassing exhaust gas to a second muffler to suppress the noise level during the warm-up period. The motor oil in the engine is mixed with fuel gas to lubricate the cylinders during the cold operation. This is achieved by employing a connecting tube between the intake pipe and motor oil circulation system, and an electrical device is used to open the connecting tube. A device is also made for the radiator fan which is kept stationary during the cold operation to hasten the increase in engine temperature. All devices are operated by a single switch attached to transmission gear shift lever, and by a thermostat attached to the engine. The devices are all activated only when the gear shift lever is in the neutral position and the engine is cold. When the engine temperature becomes hot and the gas cleaning system starts functioning, all devices are deactivated automatically.

51289

APTIC NO. 73768

Hiroyasu, Hiroyuki

NOX FORMATION IN COMPRESSED AND IGNITED ENGINE. (Asshuku chakka kikan no NOx no seisei). Text in Japanese. Nainen Kikan (Internal Combust. Engine), 14(2):41-49, 1975. (Special Issue.)

Factors affecting nitrogen oxides formation in engines are described. Pre-combustion type engines generally give low NOx concentration but consume more fuels than direct injection engines. Higher compression ratios result in lower NOx concentration for pre-combustion engines but higher NOx concentration for direct injection engines. The compression ratio affects not only the air-fuel ratio but also the delay of ignition. Variation of injection period results in changes of combustion conditions. Delay of injection shortens both the NOx formation time in high temperature gases in the cylinder and the delay of ignition. Formation of NOx in direct injection type engines decreases but that in pre-combustion type engines increases with increasing engine rotation speed. An increase of exhaust gas recirculation results in a decrease of NOx concentration, particularly at high load. It also decreases engine output and increases smoke formation. The addition of 1 g of water to every 2 g of fuel reduces NOx by 50%. Increase of inlet air temperature from 70 deg to 120 deg results in a 10-15% increase of NOx concentration, revealing little effect on NOx formation during the initial combustion period.

51290

APTIC NO. 74066

Horiike, E.

REMOVAL OF NITROGEN OXIDES BY A WET TYPE METHOD. (Shisshiki ho ni yoru chiso sankabutsu no jokyo). Text in Japanese. Ryusan to Kogyo (J. Sulfuric Acid Assoc., Japan), 28(4):90-96, April 1975. 1 ref.

A new nitrogen oxides treatment method was developed. Gas containing nitrogen dioxide was passed through a tower filled with sodium sulfide solution and the NOx concentrations were reduced from 610 ppm to 4 ppm (99.3%) or from 1700 ppm to 30 ppm (98.3%). The reduction was 97.4% (from 690 ppm to 18 ppm) or 98.2% (from 2600 ppm to 48 ppm) when three towers were used, with the first tower filled with sodium hydroxide solution, the second tower hydrogen with peroxide solution, and the third tower with sodium sulfide solution. With the first and second towers filled with NaOH solution and the third tower with Na₂S or sodium hydrosulfide, the NOx reduction rate was 97.5% or 96.2%, respectively, at an original NOx concentration of more than 2000 ppm. When an additional tower with NaOH solution was used, the reduced rate was increased slightly. Tests results at various plants showed that the three and four towers absorption methods with NaOH and Na₂S solution gave up to 99.6% NOx reduction.

51291

APTIC NO. 74063

Iida, H.

NITROGEN OXIDES CONTROL MEASURE FOR GAS BOILERS. (Gas boiler ni okeru NOx Yokusei taisaku). Text in Japanese. *Nippon Gasu Kyokaiishi (J. Japan Gas Assoc.)*, 28(4):24-34, April 1975.

Replacement of oil fuel with gas fuel could result in 30% to 60% nitrogen oxides reduction for boilers of various capacities. The maximum NOx reduction by various combustion techniques with gas fuel are as follows: two-stage combustion: 60% for large scale boilers; exhaust recirculation: 70% for large scale boilers; off-stoichiometric combustion: 70% for medium and large scale boilers; water-steam injection: 60% for medium and large scale boilers; and low NOx burners: 30-70% for boilers of various capacities. The lower NOx concentration in gas combustion than in oil combustion was due to low nitrogen compound content in gas and a different combustion mechanism. Heavy oil generally contains 0.1 to 0.4 wt% nitrogen and coal contains 0.7 to 1.5 wt% while gas usually contains negligible amounts of N. Nitrogen oxide reduction can also be achieved by improvement of combustion conditions such as low excess air combustion, low pre-heated air temperature, and adjustment of air register. Up to 40% NOx reduction can be accomplished by these techniques.

51292

APTIC NO. 74194

Imaya, Naruo

COMBUSTION TREATMENT METHOD FOR INFLAMMABLE ODOROUS GASES. (Inkasei akushu gasu no shoikyaku shoriho). Text in Japanese. *Kemikaru Enjinyaringu (Chem. Eng.)*, 20(3):81-87, March 1975.

A sealed water, direct fire deodorizer is described. Odorous gases are introduced into a sealed water chamber from the bottom of the deodorizer. The gases emerge from the water chamber as bubbles and enter the deodorizing chamber through a wave-preventing plate and furnace bed nozzles. Water soluble substances dissolved in the water are removed from the water chamber and are combusted by using a water burner. A deodorizer consuming 250 kg/hr of heavy oil and generating 50 l/hr of waste water was used to treat waste gases containing various organic substances. Acrolein was reduced from 20.4 ppm to 0.042 ppm, formaldehyde from 1.6 ppm to 0.14 ppm, acetaldehyde from 19.0 ppm to 0.006 ppm, methanol from 3.250 ppm to 0.16 ppm, xylenes from 400 ppm to 0.20 ppm, and phenols from 0.1 ppm to lower than 0.05 ppm, with an overall efficiency of 99.98%.

51293

APTIC NO. 74181

Ishida, K.

CATALYSTS IN AUTO EXHAUST GAS TREATMENT. (Jidosha Haiki Gasu Jokayo Shokubai). Text in Japanese. *Sekiyu to Sekiyu Kagaku (Petrol. Petrochem.)*, 19(3):77, March 1975.

The plans made by automobile manufacturers for meeting 1975 exhaust gas standards are reviewed. New developments such as the CVCC engine (Honda), rotary engines with thermal reactor Toyo Industrial Co.), and the recirculation engine with thermal reactor (Mitsubishi) are reviewed. Reliable performance of catalytic converter systems has been achieved by the Universal Oil Products Co. The characteristics of pellet and honey-comb catalysts and the method of dual bed systems and 3-component control systems are discussed.

51294

APTIC NO. 75067

Jahnig, C. E.

EVALUATION OF POLLUTION CONTROL IN FOSSIL FUEL CONVERSION PROCESSES. LIQUEFACTION: SECTION 2. SRC PROCESS (FINAL REPORT). Exxon Research and Engineering Co., Linden, N. J., Environmental Protection Agency Contract 68-02-0629, Program

Element 1AB013, ROAP 21ADD-023, GRU.8DJ.75, Rept. EPA-650/2-74-009-f, 87p., March 1975. 34 refs.

NTIS: PB 241792/AS

The Solvent Refined Coal (SCR) process of the Pittsburgh and Midway Coal Mining Company is described. The process is capable of converting 10,000 tons/day of Illinois type bituminous coal to 25,000 barrels/day of heavy clean liquid fuel, two-thirds of which contains 0.5% sulfur and one-third 0.2% sulfur. Hydrogen is first added directly to a non-catalytic reactor that generates 0.5% sulfur oil. The hydrogen is obtained either from by-product fuel gas, from liquid products, or by gasifying the filter cake. Further processing by catalytic hydro-treating results in the fraction of liquid containing 0.2% sulfur. The gas stream leaving the liquefaction reactor passes to a separator at 840 F from which the gas is removed overhead, passed through a desulfurization process, and recycled to the reactor. The thermal efficiency of the process is 64.0%, arrived at by dividing the heating value of salable products by the heating value of the coal fed to the liquefaction and utilities sections.

51295

APTIC NO. 75114

Kalfadelis, C. D. and E. M. Magee

EVALUATION OF POLLUTION CONTROL IN FOSSIL FUEL CONVERSION PROCESSES. LIQUEFACTION: SECTION I. COED PROCESS (FINAL REPORT). Exxon Research and Engineering Co., Linden, N. J., Environmental Protection Agency Contract 68-02-0629, Program Element 1AB013, ROAP 21ADD-023, Rept. EPA-650/2-74-009-e, GRU.7DJ.75, 71p., Jan. 1975. 71 refs.

NTIS: PB 240371/AS

The Char-Oil-Energy Development (COED) process for the conversion of coal to cleaner fuels is described. The process involves the continuous, staged fluidized-bed pyrolysis of coal at low pressure and is designed to recover liquid, gaseous, and solid fuel components from the pyrolysis train. Heat for the pyrolysis is generated by the reaction of oxygen with a portion of the char in the last pyrolysis stage and is carried counter-currently through the train by the circulation of hot gases and char. Heat is also introduced by the air combustion of the gas used to dry feed coal and to heat fluidizing gas for the first stage. The number of stages in the pyrolysis and the operating temperature of each may be varied to accommodate feed coals with widely ranging caking or agglomerating tendencies. Oil that is condensed from the released volatiles is filtered on a rotary precoat pressure filter and catalytically hydrotreated at high pressure to produce a synthetic crude oil. Medium-Btu gas which is produced after desulfurization is suitable as clean fuel or may be converted to hydrogen or to high-Btu gas in auxiliary facilities. Residual char (50-60% of the feed coal) that is produced possesses a heating value and sulfur content about the same as feed coal.

51296

APTIC NO. 73780

Kaminaga, Tetsuro and Kazuo Noguchi

KUREHA-SODIUM ACETATE GYPSUM METHOD, FLUE GAS DESULFURIZATION. (Kureha-sakusan soda sekko ho, haiei datsuryu sochi). Text in Japanese. *Kagaku Kogyo (Chem. Ind.)*, 19(5):85, 1975.

The Kureha Chemical Co. previously developed two flue gas desulfurization techniques, the sodium sulfite method and sodium sulfite-gypsum method, which after being installed at various factories have given good desulfurization results. However, these previous methods had disadvantages either of costly operation or of being non-closed systems. A third method has been developed and is now under experimental operation. The new method utilizes sodium acetate to absorb sulfur dioxide and its reaction products are acetic acid and sodium sulfite. The former product is reacted with calcium carbonate to produce calcium acetate which is further reacted with sodium sulfate to produce gypsum and sodium acetate. Sodium sulfate is produced by air oxidation and sodium

sulfite, therefore the desulfurization process is made in a closed system and the only chemical consumed is inexpensive calcium carbonate. Since the sodium acetate aqueous solution is a weak alkali, the SO₂ absorption is of high efficiency. When the pH of the absorbing solution was greater than 5.0, the desulfurization efficiency was nearly 100%, and the SO₂ level in the treated flue gas was less than 10 ppm when an initial SO₂ concentration of 1200 to 1300 ppm was used. The acetic acid concentration in the treated flue gas was less than 5 ppm. The 100% reaction between sodium sulfate and calcium acetate proceeded within 4 to 5 hr. No special heating step in the desulfurization process was necessary and the above results could be obtained under reaction temperatures between 50 to 60 C.

51297

APTIC NO. 75214

Keairns, D. L., R. A. Newby, E. J. Vidt, E. P. O'Neill, C. H. Peterson, C. C. Sun, C. D. Buscaglia, and D. H. Archer

FLUIDIZED BED COMBUSTION PROCESS EVALUATION (PHASE I - RESIDUAL OIL GASIFICATION/DESULFURIZATION DEMONSTRATION AT ATMOSPHERIC PRESSURE). VOLUME I - SUMMARY. Westinghouse Research Labs., Pittsburgh, Pa., Environmental Protection Agency Contract 68-02-0605, Program Element 1AB013, ROAP 21ADB-009, Rept. EPA-650/2-75-027-a, 132p., March 1975. 16 refs.

NTIS: PB 241 834/AS

Preliminary design and cost estimates are given for an atmospheric-pressure fluidized bed residual oil gasification/desulfurization process, known as the chemically active fluidized bed (CAFB) process. The sulfur removal capability of the process is comparable to that of lime/limestone scrubbing; and, in addition, the CAFB process provides a considerable reduction in nitrogen oxide emissions. The capital cost of CAFB is 25-50% greater than that of limestone scrubbing and is comparable to regenerative stack gas cleaning costs. Estimates for 50 and 200 MW plants are \$9,497,000 and \$28,155,000, respectively. Operating costs for the CAFB process range from 5.5-6.6 mills/KW-hr for a 50 MW plant and 3.5-5.0 mills/KW-hr for a 200 MW plant.

51298

APTIC NO. 75215

Keairns, D. L., R. A. Newby, E. J. Vidt, E. P. O'Neill, C. H. Peterson, C. C. Sun, C. D. Buscaglia, and D. H. Archer

FLUIDIZED BED COMBUSTION PROCESS EVALUATION (PHASE I - RESIDUAL OIL GASIFICATION/DESULFURIZATION DEMONSTRATION AT ATMOSPHERIC PRESSURE). VOLUME II - APPENDICES. Westinghouse Research Labs., Pittsburgh, Pa., Environmental Protection Agency Contract 68-02-0605, Program Element 1AB013, ROAP 21ADB-009, Rept. EPA-650/2-75-027-b, 438p., March 1975. 48 refs.

NTIS: PB 241 835/AS

Appendices pertaining to an evaluation of the atmospheric pressure fluidized bed residual oil gasification/desulfurization process, known as the chemically active fluidized bed (CAFB) process are presented. The CAFB produces a clean, low heating value fuel gas and is able to meet environmental emission standards for sulfur oxides, nitrogen oxides, and particulates. The appendices include process flow diagrams, energy and material balances, equipment specifications, vessel drawings, equipment arrangement drawings, a site plan, utility requirements, plant performance, environmental impact, functional operating conditions, and capital and operating costs for a 50 MW demonstration plant and for commercial plants with capacities of from 50-500 MW. Limestone sorbent support data is also provided.

51299

APTIC NO. 73774

Kita, Takehiko

A VALVE FOR PREVENTING AFTERBURNING. (Afuta buningu boshi ben). Text in Japanese. (Nissan Motor Co.,

Ltd., Yokohama (Japan)) Japan. Model Util. Sho-4900. 3p., Feb. 10, 1975. (Appl. Dec. 14, 1971, 1 claim).

A prevention apparatus for after-burn in automobile engines during their deceleration is described. The after-burn is prevented by supplying an extra air flow into combustion chambers when the automobile begins deceleration. The apparatus uses a valve mechanically connected to a diaphragm with a small hole. The valve is seated on a bundle of air pipes each of which leads to one combustion chamber, thus it closes and opens simultaneously, but independently, all air pipes. When the engine decelerates, the diaphragm responds to the decreased pressure within the intake manifold and opens the valve through which supplemental air flow is permitted to the combustion chambers. However, the small hole on the diaphragm quickly equalizes the pressure at both sides of the diaphragm, thus closing the valve. Since any of two combustion chambers are not connected through the air pipes when the valve is in its closed position, an independent supply of extra air to individual combustion chambers is therefore supplied without decreasing engine power.

51300

APTIC NO. 72134

Krueger, J.

FLAMES WITH WHIRL. (Flammen mit Drall). Text in German. Brennstoff-Waerme-Kraft, 27(2):43-49, Feb. 1975. 12 refs.

Favorable environmental conditions can be achieved in furnace operation by producing as little as possible of undesirable exhaust gases. In the case of whirl burners, this is possible by operating at nearly critical whirl. The effects of internal flow obstructions (burner lances) on the critical whirl are investigated. The front area of the internal flow obstructions lies in the discharge plane of the burner. The effect of the flow obstructions is estimated by calculations based on a model scheme. Results obtained by experiments confirm the predicted relations. Several discharge geometries are being investigated.

51301

APTIC NO. 73772

Kurahashi, Yukinori and Mitsuji Baji

FLUE GAS DESULFURIZATION AND EXHAUST GAS TREATMENT. (Haen datsuryu, haiki shori ni kansuru ichi kosatsu). Text in Japanese. Nenryo Oyobi Nensho (Fuel and Combustion), 42(3): 235-240, March 1975.

A 200,000 N cu m/hr flue gas desulfurization apparatus was installed by Toyo Boseki (Electric) Co. The original design to reduce white smoke from the desulfurization tower was to heat the flue gas from 55.7 deg to 130 deg using a heating furnace, which would require a total fuel cost of \$500,000/yr. Other measures were considered for their feasibilities. Heating the flue gas to 100 or 130 deg by steam heater requires 5860 kg/hr and 9500 kg/hr of steam, respectively. Besides the high cost of steam, there were other problems, such as a high pressure difference. Heating of the flue gas by mixing with boiler waste gas resulted in low desulfurization efficiency. Treatment of the white smoke by cooling the flue gas from 55.7 to 34 deg required vast quantities of cooling water. Therefore, none of the methods considered were feasible.

51302

APTIC NO. 72197

Lear, C. W., W. F. Krieve, and E. Cohen

CHARGED DROPLET SCRUBBING FOR FINE PARTICLE CONTROL. J. Air Pollution Control Assoc., 25(2):184-189, Feb. 1975. 3 refs.

Basic mechanisms of the interaction of highly charged scrubbing droplets with fine particulates are reviewed along with laboratory and pilot-scale results obtained with a charged-droplet scrubber. The most effective mechanisms in the fine particulate size range (0.1-1.0 micron) are electrically augmented impact scrubbing and charge exchange without impact. A charged droplet scrubber using electrohydrodynamically sprayed droplets and an applied field to achieve electrical im-

part scrubbing appears capable of inducing high densities of droplets (100 micron size range) that are charged to near their upper stability limit. Collection efficiencies of 30-50% per stage are demonstrated in the submicron particulate size range. (Author abstract modified)

51303

APTIC NO. 74188

Maartmann, Sten

ELECTROSTATIC PRECIPITATORS FOR AIR POLLUTION CONTROL - A FLAKT TECHNICAL REPORT.

(Elfilter for effektiv, industriell rokgasrening). Text in Swedish. *Kem. Tidskr.*, 87(1-2):42-44, Feb. 1975.

Modern electrostatic precipitators designed and manufactured by AB Svenska Flaktfabriken and their uses are described. The increased environmental requirements worldwide have led to an increased use of high-quality dust separators, such as electrostatic precipitators, high-pressure venturi scrubbers, and bag filters, and to a decline of mechanical dust separators and low-pressure venturis. Electrostatic precipitators are capable of handling gas temperatures over 300 C, which is advantageous for the removal of gaseous pollutants such as sulfur dioxide and nitrogen oxides, by means of high-temperature catalysts in the purified gases with low residual dust concentration. Dust and arsenic oxides, formed at temperatures between 100 and 120 C in a copper ore roasting plant, are separated separately by means of electrostatic precipitators operating at 325 C and 130 C, respectively, at efficiencies of 97.5% and 99%. Finely dispersed particulates, such as sodium particles, present in flue gases from the incineration of chemical wastewaters with sand and oil, are efficiently separated by means of electrostatic precipitators. Residual dust concentrations as low as 50 mg/N cu m can be reached.

51304

APTIC NO. 75199

Matts, S.

COLD-SIDE ELECTRIC PRECIPITATORS FOR HIGH-RESISTIVITY FLY ASH REQUIRE DIFFERENT DESIGN PHILOSOPHY. Environmental Protection Agency, Washington, D. C., Office of Research and Development, Symp. Electrostat. Precipitators Control Fine Part., Research Triangle Park, N. C., 1975, p. 229-236, EPA-650/2-75-016.

NTIS: PB 240440/AS

European versus American designs for electrostatic precipitators are discussed in economic terms, with particular reference to the use of cold-side electrostatic precipitators for the collection of high-resistivity fly ash. Below a certain temperature of the flue gas being treated, the dust components absorb increasing amounts of moisture, resulting in a decrease in resistivity. The peak resistivity occurs around 150 C, i.e., close to normal operating temperatures after the air heater. Cold-side precipitator operation using less-sectionalized European precipitators is more economical than hot-side precipitator operation for American fly ashes.

51305

APTIC NO. 74232

McMichael, W. J., L. S. Fan, and C. Y. Wen

ABSORPTION OF SO₂ IN SPRAY COLUMN AND TURBULENT CONTACTING ABSORBERS. Preprint, American Inst. of Chemical Engineers, New York, 60p., 1975. 31 refs. (Presented at the American Institute of Chemical Engineers, National Meeting, 79th and at the 8th Petrochemical and Refining Exposition, Houston, Tex., March 16-20, 1975.)

Experimental data from both small and large turbulent contacting absorbers and spray columns used in the wet scrubbing of sulfur dioxide from flue gas were analyzed to obtain the gas film mass transfer coefficients and the overall coefficients in the liquid film. The scrubbing slurries investigated were recycled limestone-magnesium oxide-water slurries and recycled lime slurries. The overall mass transfer resistances in the liquid phase for both scrubbers were correlated in terms of the

ratio of the gas film and liquid film mass transfer resistances. The ratio of the gas and liquid film mass transfer resistances, or the fraction to which SO₂ removal was gas film controlled, increased with increasing slurry pH and magnesium concentration and decreasing SO₂ partial pressure. The correlations for the gas film mass transfer coefficient and the ratio of mass transfer resistances predicted fairly accurately experimentally observed SO₂ removal efficiencies for widely differing sized TCA and spray column scrubbers. A mechanism for SO₂ absorption into limestone slurries was postulated that involves the absorbed SO₂ as sulfurous acid undergoing instantaneous and irreversible parallel reactions with hydroxyl anion, bicarbonate, calcium bicarbonate, and magnesium bicarbonate as it diffuses into the liquid phase. (Author abstract modified)

51306

APTIC NO. 74062

Mizobuchi, I.

LOW NOX COMBUSTION IN CYLINDRICAL COMBUSTION CHAMBER BOILER. (Rozutsu enkan boira ni okeru tei NOx ka nensho). Text in Japanese. *Netsu Kanri To Kogai* (Heat Management Public Nuisance), 27(3):33-37, 1975.

A three-circuit cylindrical combustion chamber boiler was tested for nitrogen oxide reduction by two-stage combustion with or without steam injection. At 4% oxygen, the lowest NOx concentrations were found at air ratios below 1.10 for combustions at normal conditions, by two-stage combustion and two-stage combustion plus steam injection. The NOx concentration in the combustion gases for the three combustion methods were 130-140 ppm, 90-100 ppm, and 60-80 ppm, respectively, with A heavy oil as fuel and 240-260 ppm, 200-230 ppm, and 180-200 ppm, respectively, with B heavy oil as fuel. The NOx reductions by exhaust recirculation and exhaust recirculation plus steam injection combustion methods were 14-19% and 49-53%, respectively, for A heavy oil, and 15-21% and 15-22%, respectively, for B heavy oil. Internal steam and external steam could be used for steam injection.

51307

APTIC NO. 74208

Morimura, Kiyoshi

THE CONTROL OF ORGANIC SOLVENTS VAPOR. (Haigasuchu no yuki yozai no shori ni suite). Text in Japanese. *Shikizai Kyokai shi* (J. Japan Soc. Color Mater.), 48(2):94-98, Feb. 1975. 4 refs.

The treatment of organic solvents in waste gases is discussed. Control methods include adsorption, direct combustion, and catalytic oxidation. Activated carbon is generally used as an adsorbent for organic solvents. Waste gases containing large quantities of mist can be pretreated by scrubbing or filtering. Nearly 100% solvent conversion can be achieved by direct combustion. Water vapor must be removed by condensation at 45 C, and dusts must be treated by a dust collector before the waste gas is combusted, however. Catalytic oxidation destroys organic solvents at temperatures lower than the firing point, thus reducing the fuel costs. Catalysts are usually dispersed on supports to increase their effective surface. Dusts, tar, chlorides and sulfur compounds cause temporary poisoning of catalysts, and pretreatment of these substances is important for maintaining catalyst life.

51308

APTIC NO. 73825

Morita, Y. and M. Takayasu

SOLID CATALYSIS FOR NOX REMOVAL. (NOx jokyo yo kotai shokubai). Text in Japanese. *Seramikkusu* (Ceramics), 10(4):224-229, April 1975.

Noble metal catalysts such as platinum, palladium, rhodium, and osmium supported by gamma-alumina or silica can be used for treating exhaust gases from moving sources which do not contain sulfur dioxide. Hydrogen, carbon monoxide, and hydrocarbons are used as reducing agents. These catalysts are stable at high temperature and their activities at low temperature are remarkably high. Metal oxides such as cupric oxide,

CuO-chromic oxide, CuO-zinc oxide, and ferric oxide-Cr₂O₃ supported by gamma Al₂O₃ or SiO₂ are also good catalysts for nitrogen oxides conversion. Test results for 1000 ppm nitric oxide with H₂ as reducing agent showed 100% NO conversion at 300 deg for Pt, Pd, nickel, and Cu and 95.5% to 100% conversion at 400 degrees for chromium, molybdenum, iron and cobalt catalysts. At 200-300 deg, Pt and Cr, Co, and manganese oxides supported by Al₂O₃ showed excellent reactivities as oxidation catalysts for NO. Catalysts supported by silicon carbide showed NO oxidation reactivities in the decreasing order of cobalt oxide (Co₃O₄), manganic oxide, Fe₂O₃, nickel oxide, Cr₂O₃, CuO, ZnO and vanadium pentoxide. As NO decomposition catalysts, the reactivity decreases in the order of Co₃O₄, CuO, NiO, Fe₂O₃, and Cr₂O₃.

51309

APTIC NO. 75359

Morris, R. B., F. B. Higgins, Jr., J. A. Lee, R. Newirth, and J. W. Pervier

ENGINEERING AND COST STUDY OF AIR POLLUTION CONTROL FOR THE PETROCHEMICAL INDUSTRY. VOLUME 4: FORMALDEHYDE MANUFACTURE WITH THE SILVER CATALYST PROCESS (FINAL REPORT). Air Products and Chemicals, Inc., Marcus Hook, Pa., Houdry Div., Office of Air and Waste Management Contract 68-02-0255, Rept. EPA-450/3-73-006-d, 94p., March 1975. 17 refs.

NTIS: PB 242118/AS

An engineering and cost analysis of formaldehyde manufacturing operations using the silver catalyst process is presented. Air emissions from such operations consist of formaldehyde, methanol, methyl formate, methylal, and carbon monoxide; significant quantities of hydrogen are also emitted. The most feasible air pollution control system for new plants using the silver catalyst process consists of utilizing the waste gas as a fuel supplement in the boiler house and effecting a total (or partial) recycle of vent gases from the product fractionator. The estimated capital cost of installing the necessary equipment on all new plants by 1985 is about \$3,000,000 for the industry and \$50,000 per plant. Existing plants can utilize either incinerators or scrubbers for pollution control at an estimated cost of \$3,000,000 for the industry as a whole. (Author summary modified)

51310

APTIC NO. 75381

Morris, R. B., F. B. Higgins, Jr., J. A. Lee, R. Newirth, and J. W. Pervier

ENGINEERING AND COST STUDY OF AIR POLLUTION CONTROL FOR THE PETROCHEMICAL INDUSTRY. VOLUME 5: FORMALDEHYDE MANUFACTURE WITH THE MIXED OXIDE CATALYST PROCESS (FINAL REPORT). Air Products and Chemicals, Inc., Marcus Hook, Pa., Houdry Div., Office of Air and Waste Management Contract 68-02-0255, Rept. EPA-450/3-73-006-e, 82p., March 1975. 19 refs.

NTIS: PB 242547/AS

An engineering and cost analysis of air pollution control techniques for formaldehyde manufacturing with the mixed oxide catalyst process is presented. The air emissions from the process include formaldehyde, dimethyl ether, methanol, and carbon monoxide. The best demonstrated technique for the control of all emissions except carbon monoxide appears to be recirculation of the main vent stream which also improves process efficiency. Assuming that all future mixed oxide processes incorporate the best present day recycling techniques, the 25 million lb of emissions estimated for 1973 are expected to increase to just over 32 million lb/yr by 1985. The use of thermal incineration to reduce carbon monoxide emissions appears capable of reducing the process emission factor to about 0.001 lb/lb of 37% formaldehyde, resulting in just over 3 million lb/yr of emissions by 1985. The cost of a single incinerator serving a 100 MM lb/yr capacity plant is \$34,000. Recycling, which does nearly as well as water scrubbing with respect to air emissions, is less expensive than scrubbing. (Author summary modified)

AIR POLLUTION ABSTRACTS, OCTOBER 1975

51311

APTIC NO. 75329

Most, G.

TOUR OF A DRY COKE QUENCHING SYSTEM IN THE USSR AND TOUR OF COKING PLANTS IN JAPAN. (Besuch einer Kokstroeklenloeschanlage in der UdSSR und Besuch von Kokereien in Japan). August Thyssen-Huette AG (Germany). Translated from German. Leo Kanner Associates, Redwood City, Calif., 131p., Feb. 1975.

Systems for coke pushing without air pollutant emissions are discussed, with particular reference to technology in the USSR and Japan. The principle requirement for controlling emissions during coking operations is that the entire quenching car be covered by a hood; this necessitates the installation of a third rail. Mobile dedusters can be installed at a slight additional cost since it is possible to bear the weight of the deduster on the guide car rails and on the third rail. Static systems are advantageous where it is necessary to install an electrostatic precipitator downstream of the coke quenching system; this is not possible on hooded tender cars. A typical system for pushing coke without emissions comprises a central line with a stationary deduster and a hood, a Rotoclone-N-scrubber, a suction rate of 3000 cu m/min, a total compression of 400 mm water, and a scrubber pressure drop of 150 mm H₂O.

51312

APTIC NO. 73767

Munakata, Eiji and Eisuke Munakata

A METHOD OF REDUCING SULFUR CONTENT OF MINERAL OIL. (Koyu no iou bun o jyokyoshite iou konyuritsu o icgen seshimeru hoho). Text in Japanese. (Assignee not given.) Japan. Pat. Sho 50-6004. 3p., March 10, 1975. 2 refs. (Appl. Feb. 16, 1970, 1 claim).

A method of reducing sulfur content in mineral oil is described. The technique uses the extraction of sulfur compounds in mineral oil by hot water. Hot water is introduced from the top of a separation column and mineral oil enters from the bottom and the countercurrent movement of the two liquids effectively mixes them, increasing the extraction of efficiency. The specific gravity of the two liquids is important for the extraction efficiency. The difference in the specific gravities of the two liquids must be small when highly viscous oils are purified, while it must be large for less viscous oils. Therefore the specific gravity of the extraction liquid is determined by individual mineral oils. The extraction liquid can be acid or base and heated to 100 to 350 C for the extraction. When a 1.0% sulfur containing light oil with a specific gravity of 0.83 was extracted with 280 C water by the present method, the sulfur content of the purified light oil decreased to 0.4%.

51313

APTIC NO. 74070

Muroki, T.

EXHAUST EMISSION CONTROL OF SPARK IGNITION ENGINE. (Hibana tenka no haiki seigyō ni tsuite). Text in Japanese. Jidosha Gijutsu (Automobile Eng.), 29(4):309-317, 1975. 8 refs.

A general description is given on exhaust control for rotary engines and conventional engines by thermal or catalytic reactors. Noble metal catalysts usually have greater efficiency for carbon monoxide and hydrocarbon conversion while base metal catalysts have greater efficiency for nitrogen oxides conversion. The conversion efficiency of catalysts also depends on the gas temperature at the entrance to the catalyst, particularly when catalyst fatigue is significant. Reactivities of CO and HC in thermal reactors increase remarkably at a given air-fuel ratio is gradually increased. The optimum air-fuel ratios depend on gas temperature and the structure of the thermal reactor. Control of CO and HC in exhaust can be achieved by delaying ignition time and supplying an optimum quantity of secondary air, and by using deceleration control valves. Reductive catalysts can be used for NO_x removal at high efficiency. The resulting ammonia is again converted into NO_x by oxidative catalysts, but the overall NO_x is generally reduced.

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APTIC NO. 74069

Nagai, Sukeo

A CARBURETOR FOR INTERNAL COMBUSTION ENGINES. (Nainenkikan no kyabureta). Text in Japanese. (Assignee not given.) Japan Pat. Sho 50-6899. 9p., March 19, 1975. (Appl. July 8, 1971, 1 claim).

A carburetor which can supply a fuel and air mixture at small range of variation by combining two area-type mixers is described. The device has two ratio-mixers with the first mixer consisting of a mixing valve, a mixer main body, and a pressure regulator and the second mixer having an LP gas supplier for engine starting. The air-fuel mixture concentration (ca. 20%) from the first mixer is led to the second mixer where air is further mixed at a given ratio. The device has the following advantages: no lead pollution; a small range of air-fuel ratio variation so that the formation of carbon monoxide and hydrocarbons are negligible; adjustable air quantity corresponding to temperature; high efficiency of gas mixing; low pressure requirement for supplying air to the first mixer so that the output loss is minimal; and physical compatibility with conventional gasoline automobile.

51315

APTIC NO. 73818

Hamanaka, K., A. Tanba, Y. Matsunaga, Y. Shirai, S. Inohara, T. Koizumi, and S. Sato

A DATA LOGGING SYSTEM AND AN AUTOMATIC START-UP AND SHUT-DOWN SYSTEM FOR WET TYPE GAS DESULFURIZATION PLANTS. (Shisshiki haen datsuryu puranto no jidoka, deta shori jido hattei shisutemu). Text in Japanese. Mitsubishi Juko Giho (Mitsubishi Heavy Ind. Tech. Rev.), 12(1):41-46, Jan. 1975.

The description of a data logging system and an automatic start-up and shut-down system developed by Mitsubishi Heavy Industries for the purpose of saving labor and facilitating the operation in lime-gypsum wet-type gas desulfurization plants is given. The process flow of wet-type desulfurization plants, hardware system configuration of the mini-computer Mitsubishi Denki MELCOM 350-7, and software configuration are given. The data processing system consists of process input, recording, data indication, correction, monitoring, and warning processes. The automatic start-up and shut-down system is described with a block diagram of start-up and shut-down operation. The panel design and operator's console design of the automatic start-up and shut-down system and an example of sequence control and operation unit are also described. The characteristics of the system are a standardized design and flexibility for changes of plant specifications and sequence logic without changing the program.

51316

APTIC NO. 74064

Nonaka, Kinzo

AN ELECTROSTATIC AIR CLEANER. (Seidenshiki kuki seijiyoki). Text in Japanese. (Todai Musen K. K., Tokyo (Japan)) Japan. Model Util. Sho 50-11566. 4p., April 10, 1975. (Appl. Nov. 5, 1970, 1 claim).

An electrostatic precipitator utilizing mechanical friction between particle and filter for generating charges and featuring further utilization of the charge effect for lighting is described. The device consists of a filter housing, a set or more than a set of filters, and a fan driven by a motor. The set of filters is composed of two filters with filtering materials different in charge orientation. An electrically conductive metal net is inserted in each filter and the terminals of the two metal nets are connected to a discharge tube. The friction between the first filter, which has a positive charge orientation, and the particles generates a positive charge on the former and a negative charge on the latter. The particles which are not collected by the first filter are repulsed by the second filter which becomes negatively charged. The increase in the potential difference between the two filters results in the discharge of the discharge tube.

51317

APTIC NO. 74067

Nozawa, Masaaki

DEVELOPMENT OF LOW NOX BURNER FOR GAS BOILERS. (Gasu yo tei NOx bana NO kaihatsu). Text in Japanese. MOL, 13(4):25-29, April 1975.

A general discussion is given on new nitrogen oxides burners and new combustion methods. The low air ratio pre-mixing combustion method extended the idea of two-stage combustion and the combustion was performed at two completely separated stages. The first stage combustion was carried out at a low air ratio for complete decomposition of fuel to reduce the prompt nitric oxide. Up to 50% of NOx was reduced by the second stage combustion with a fine diffusion flame at 20% exhaust recirculation. The high-air ratio pre-mixing combustion method used excess air for the combustion. The air ratio used was 1.5-1.8 depending on the kind of fuel. Experimental results showed that 1.5 air ratio with methanol as fuel, the NOx could be reduced to below 10 ppm at a combustion scale of 95,000 kcal/hr. New burners using the above methods were developed and tested at various plants with satisfactory results.

51318

APTIC NO. 74073

Okada, Y.

PRESENT STATE OF LOW NOX BURNERS AND THEIR EXAMPLES. (Genjo ni okeru tei NOx bana to sono jitsurei). Text in Japanese. Kankyo Sozo (Environment), 5(5):52-56, May 1975.

Several low nitrogen oxides measures were tested at the Chugai Furnace Co. Low air ratio technique was tested for a furnace generating 2 million kcal/hr heat by using heavy oil which contained 0.28 wt% nitrogen. Reduction of air ratio from 1.3 to 1.1 resulted in NOx reduction from 220 ppm to 155 ppm for test burner 1 and from 190 ppm to 125 - 155 ppm for test burner 2. A nozzle mix type low NOx gas burner was used for a test furnace 620 mm in diameter and 2450 mm in length with a combustion capacity of 150,000 kcal/hr the NOx concentration in flue gas was reduced from 35-55 ppm to 10-25 ppm with methane as fuel and from 90-100 ppm to 20-50 ppm with butane as fuel, as compared to a conventional burner. A burner equipped with a steam injector which forced the mixing of combustion gas with air was used for a test furnace consuming 1600 kg/hr kerosene. At total steam injection of 30 wt% (steam/fuel) and air ratio of 1.05, NOx reduction was as high as 60%.

51319

APTIC NO. 74133

Ozawa, Tokuji

FLUIDIZED-BED COMBUSTION OF COAL. (Sekitan no ryudo nensho ni suite). Text in Japanese. Nenryo Kyokaiishi (J. Fuel Soc. Japan) (Tokyo), 54(575):132-145, 1975, 10 refs.

The fluidized-bed combustion of coal (FBC) is discussed. Characteristics of FBC process are as follows: any type of coal may be used; sulfur oxide emissions are low as a result of desulfurization with limestone or dolomite; nitrogen oxides emissions are reduced; the temperature is uniform and easy to control; the heat exchange capacity is high; the calorific value per unit volume is high; corrosion boiler tube is reduced; combustion efficiency is high; and equipment and running costs are low. Some disadvantages of FBC processes are abrasion of heat transfer tubes, pressure loss, and the necessity for a dust collector. Both non-pressurized and pressurized FBC processes are reviewed in terms of combustor structure, operating variables, and experimental results. Future prospects of FBC are also discussed.

51320

APTIC NO. 75209

Pilat, Michael J.

COLLECTION OF AEROSOL PARTICLES BY ELECTROSTATIC DROPLET SPRAY SCRUBBERS. Environmental Protection Agency, Washington, D. C., Office of

Research and Development, Symp. Electrostat. Precipitators Control Fine Part., Research Triangle Park, N. C., 1975, p. 447-458, EPA-650/2-75-016. 11 refs.

NTIS: PB 240440/AS

Theoretical calculations and experimental measurements show that the collection of small aerosol particles (0.05-5 micron) by water droplets in spray scrubbers can be substantially increased by electrostatically charging the droplets and particles to opposite polarity. The particle collection efficiency of a 140 acfm two-chamber spray scrubber increased from 68.8% at uncharged condition to 93.6% at charged conditions, using a dioctyl phthalate test aerosol with a mass mean diameter of 1.05 micron. The collection efficiency for 0.3 micron particles increased from 35% to 87% when charging was employed. Collection efficiencies ranging from 60-99% by weight were obtained with a 1000 acfm pilot plant electrostatic scrubber handling particle emissions exhausting from sulfur dioxide absorption towers at a pulp mill. (Author abstract modified)

51321

APTIC NO. 75358

Princiotta, Frank T.

SULFUR OXIDE THROWAWAY SLUDGE EVALUATION PANEL (SOTSEP), VOLUME I: FINAL REPORT - EXECUTIVE SUMMARY. Environmental Protection Agency, Research Triangle Park, N. C., Control Systems Lab., Program Element 1AB013, ROAP 21ACY-030, Rept. EPA-650/2-75-010-a, 72p., April 1975.

NTIS: PB 242618/AS

An evaluation of the environmental and economic factors associated with the disposal or utilization of sludge from non-regenerable flue gas desulfurization processes is presented. Lime/limestone scrubbing systems have cost advantages over regenerable flue gas desulfurization systems up to sludge disposal costs of about \$4/wet ton, assuming the sludge includes no ash. Appreciable commercial utilization of sulfur oxide sludge is unlikely, and disposal by ponding and landfill appears to be the only important near-term alternative. Water pollution problems can be prevented by proper pond lining and operation in a closed-loop mode, and land deterioration problems can be eliminated by chemical treatment (fixation) of the sludge.

51322

APTIC NO. 75383

Princiotta, Frank T.

SULFUR OXIDE THROWAWAY SLUDGE EVALUATION PANEL (SOTSEP) VOLUME II: FINAL REPORT - TECHNICAL DISCUSSION. National Environmental Research Center, Research Triangle Park, N. C., Control Systems Lab., Program Element 1AB013, ROAP 21ACY-030, Rept. EPA-60/2-75-010-b, 303p., April 1975. 143 refs.

NTIS: PB 242619/AS

An evaluation of the environmental and economic factors associated with the disposal or utilization of sludge from non-regenerable flue gas desulfurization processes is presented. Lime/limestone scrubbing systems appear to have cost advantages over regenerable flue gas desulfurization systems up to sludge disposal costs of about \$4/wet ton, assuming the sludge includes no ash. Appreciable commercial utilization of sulfur oxide sludge is unlikely, and disposal by ponding and landfill appears to be the only important near-term alternative. Water pollution problems can be prevented by proper pond lining and operation in a closed-loop mode, and land deterioration problems can be eliminated by chemical treatment (fixation) of the sludge.

51323

APTIC NO. 75213

Roessler, W. U. and A. Muraszew

EVALUATION OF PRECHAMBER SPARK IGNITION ENGINE CONCEPTS (FINAL REPORT). Aerospace Corp., El Segundo, Calif., Environmental Programs Group, Environmental Protection Agency Grant R-802499-01, Pro-

gram Element 1AB014, ROAP 21BCC, Rept. EPA-650/2-75-023, 239p., Feb. 1975. 88 refs.

NTIS: PB 241 780/AS

The performance, emission, and operational characteristics of various experimental and commercial prechamber, spark-ignition engines (stratified charge engines) are reviewed. Relative to conventional automotive engines, prechamber engines exhibit very low carbon monoxide emissions and show some reduction in the emission of nitrogen oxides. Hydrocarbon emission levels from prechamber engines, however, are similar to those generated by conventional engines employing non-catalytic emission control systems, indicating a need for after-treatment devices such as lean thermal reactors or catalytic converters. The fuel consumption of vehicles equipped with prechamber engines is similar to or slightly better than that of equivalent conventional vehicles at comparable levels of emission control. (Author abstract modified)

51324

APTIC NO. 74239

Rosbach, R. J.

POTASSIUM TOPPING CYCLES FOR STATIONARY POWER (FINAL REPORT). General Electric Co., Cincinnati, Ohio, Office of Coal Research and National Aeronautics and Space Administration Contract NAS 3-17354, Rept. NAS CR-2518, GESP-741, 129p., March 1975. 34 refs.

Various potassium topping cycles for steam power plants were evaluated in terms of economic and environmental considerations. A pressurized boiler plant and a fluidized bed plant were selected as the two most desirable configurations. A potassium topping cycle powerplant with a supercharged furnace is capable of using clean gas from a coal gasification plant, thus eliminating the problems of sulfur dioxide and particle emissions. Carbon monoxide and nitrogen oxide emissions can be controlled by the design of the combustion system. The fluidized bed combustor which uses coal directly achieves sulfur removal by chemical reaction with limestone in the bed. Nitrogen oxides are controlled by removing heat in the bed with potassium boiler tubes. Levels of 50-150 ppm NOx in the effluent gases from fluidized bed boilers operating at 6 atmospheres pressure are reported. Sulfur dioxide emissions from fluidized beds can be reduced to the regulation level of 1.2 lb SO₂/million Btu for 1% sulfur at a removal efficiency of 60%. Sulfur dioxide emission control in gas fueled pressurized boiler systems depends on efficient scrubbing of the fuel gas obtained from the coal gasifier, and effluent levels of 1.2 lb SO₂/million Btu are reported. The pressurized fluidized bed topping cycle system is capable of a coal to busbar efficiency of 0.499 as compared with 0.422 for the pressurized boiler topping cycle. Capital costs of the pressurized fluidized bed system are \$143 million more than for the pressurized boiler system for a 1200MW plant.

51325

APTIC NO. 73804

Saito, Shigeru

SODIUM ACETATE-GYPSUM DESULFURIZATION PROCESS FOR FLUE GAS. (Sakusan soda sekkoho haen datsuryu puroseshu). Text in Japanese. Kemikaru Enjiniryaku (Chem. Eng.), 20(3):17-19, March 1975.

The sodium acetate-gypsum desulfurization process uses the reaction between sulfur dioxide with sodium acetate solution to form sodium sulfite and acetic acid. The acetic acid produced reacts with externally added calcium carbonate to form calcium acetate. The sodium sulfide is air oxidized in an oxidation tank. The reaction between sodium sulfate and calcium acetate produces calcium sulfate as gypsum and sodium acetate which can be reused. Since sodium acetate has high solubility and shows a weak alkalinity in water, sodium acetate is favorable to use for SO₂ absorption, and SO₂ levels less than 10 ppm can be expected in the flue gas using this process. If the initial concentration of sodium acetate is adjusted to react with the maximum SO₂ level anticipated in the flue gas, the system can be controlled by adjusting the amount of calci-

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um carbonate addition to give a constant pH value. The system can be made completely closed, since no chemicals except calcium carbonate are consumed and the water produced is pure enough to be recirculated. With the additional use of a metal catalyst, a denitrification is also possible in this system.

51326

APTIC NO. 72377

Schaaf, Hanno and Horst Zapf

THE NATURAL GAS ENGINE AS A LOW POLLUTION POWER SYSTEM FOR COMMERCIAL VEHICLES.

(Der Erdgasmotor als umweltfreundlicher Nutzfahrzeugantrieb). Text in German. *Automobiltech. Z. (Stuttgart)*, 77(3):67-72, 1975. 6 refs.

The major advantage of the spark-ignition natural gas engine over the diesel engine is the fact that its exhaust gas is free from soot or smoke and odor. The natural gas engine will be able to meet all future requirements with regard to emission of nitric oxide, carbon monoxide, and hydrocarbons. For this purpose, no auxiliary equipment is required—it is merely necessary to optimize the engine and operating parameters combustion air ratio, compression ratio, and ignition point. The correlation between engine output, specific fuel consumption, combustion air ratio, ignition point, and NO emission were determined. According to these determinations, it is advisable to operate the engine at a compression ratio as high as possible and at a late ignition point. The limits to the increase in the compression ratio are set by the ignition systems available today. According to the USA-13-mode cycle for commercial vehicles with diesel engines, the sum of NO and unburned HC is 3.8 g/BHP hr and that of CO is 1.5 g/BHP hr, at a compression ratio of 14 and an ignition point of 2 deg of crank angle before TDC.

51327

APTIC NO. 72378

Schreiber, Erich and Rainer Cichocki

DEVELOPMENT OF LOW EMISSION HIGHWAY DIESEL ENGINES.

(Der Entwicklungsstand schadstoffarmer Fahrzeug-Diesel motoren). Text in German. *Automobiltech. Z. (Stuttgart)*, 77(3):82-84, 1975. 1 ref.

The characteristics of an Anstalt fuer Verbrennungsmotoren naturally aspirated L-6 cylinder engine are plotted over the 13-mode cycle emissions at various injection timings. The smoke levels are absolutely low and almost independent of the injection timing. This has been achieved by means of a specially shaped intake port, as well as by a most careful matching of the decisive injection and combustion system parameters. The 13-mode emission level of the engine's optimum performance version is as low as 8 g/BHP-hr. By simply retarding the injection timing, a 4.5 g/BHP-hr low emission engine version is obtained, with the only sacrifice a 6% loss in power and fuel economy compared with the optimum performance version. However, the substantially lower combustion pressures of the low emission version, going hand in hand with the lowered thermal load of engine components, disclose new advantageous aspects with regard to engine service life, power to weight ratio, and combustion noise. Accordingly, even a conversion of heavy duty gasoline engines into direct injection diesel engines could become a practical solution. Turbocharging aggravates the complexity of interrelated parameters.

51328

APTIC NO. 74162

Shibutani, Akira

ELECTRO FIELD SCREEN TYPE DUST COLLECTOR.

(Denkai sukurin gata shujin sochi). Text in Japanese. *Kemikaru Enjinyaru (Chem. Eng.)*, 20(3):20-22, March 1975. 6 refs.

An electric field screen (ES) precipitator is described. The precipitator eliminates ionization retardation by high resistance dusts and re-scattering of low resistance dusts encountered in conventional electric precipitators. A conventional charging device employing corona discharge is used, and a high electric field is maintained in the charging space; the current is con-

trolled to prevent ionization retardation and re-scattering. Charged particles are collected by an electric field screen composed of a row of channel type, paired electrodes. The electric field screen precipitator can further reduce the dust concentration of treated gases from 0.1 to 0.03 g/normal cu m. The precipitator also occupies less space, is more stable and, gives less pressure loss.

51329

APTIC NO. 73895

Shimomura, Munekazu

ORGANIC SOLVENT EMISSION CONTROL BY UN-CATALYZED INCINERATION PROCESS.

(Chokusetsu nensho hoshiki ni yoru yukiyoza joki no shori). Text in Japanese. *Shikizai Kyokaishi (J. Japan Soc. Color Mat.)*, 48(2):99-105, Feb. 1975.

A general discussion is given on the treatment of organic solvents by direct-fire combustion. The basic conditions for designing a direct-fire combustion apparatus include quick and thorough mixing of organic solvents and flame and abilities to retain the firing temperature at a constant value and to seal the organic solvents in the system for a given length of time for complete combustion. The basic structure of the apparatus varies with the residual oxygen concentration. At residual O₂ concentration higher than 18 vol%, the organic solvents are completely combusted by the O₂ while at residual O₂ concentrations below 18 vol% additional O₂ must be supplied. Direct-fire combustion is used for various facilities including off-set printing dryers, coating booths, starching dryers, baking machines, coating sand mills, and vinyl coating furnaces. The direct-fire combustion method could reduce toluene, phenol, formaldehyde, acetone, methyl ketone, and ammonia from 550 ppm, 19.54 ppm, 38 ppm, 240 ppm, 720 ppm and 23 ppm to less than 0.1 ppm, 0.03 ppm, 0.1 ppm, 0.1 ppm, 0.1 ppm and 0.26 ppm respectively.

51330

APTIC NO. 74080

Shiroiwa, Masao

ENVIRONMENTAL IMPROVEMENT AT OJI PAPER MILL, TOMAKOMAI PLANT.

(Oji seishi tomakomai kojo no kankyo kaizen taisaku ni tsuite). Text in Japanese. *Kogai Boshu Netsu Kanri Hokkaido (Hokkaido Assoc. Energy Pollut. Control, Japan)*, 28(90):13-18, Jan. 1975.

The Oji Paper Mill, Tomakoma Plant is the world's largest newsprint producer with a production capacity of 2400 tons/day. At the Tomakomai Plant, more than \$33 million was spent in 1973 for environmental pollution control projects. The major projects undertaken in 1973 were a chemi-grand pulp waste liquid combustion system, a secondary treatment device for waste water, a 200-meter flue stack, a total desulfurization system for two boilers, and a nitrogen oxides emission control device. The description of major air pollution control measures, which includes a desulfurization system for heavy oil boilers and other boilers, use of fuel with low sulfur content, a 200-meter flue stack, nitrogen oxides emission control by means of two-stage combustion and exhaust gas recirculation methods, and the use of dust collectors, is given. For water pollution control, the sulfite pulp waste liquid combustion, chemi-grand pulp waste liquid combustion, and waste water treatment process are described. The disposal of other waste products is also discussed.

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APTIC NO. 74185

Smirnov, S. P., V. A. Budaev, and M. P. Nerushin

DUST SEPARATOR.

(Pyleculavliyayushchiy apparat). Text in Russian. *Mashinostroi.*, no. 1:22-23, 1975.

A dust separator for finely dispersed dust as generated in metallurgical plants is described. The separator is composed of tubular elements of 1000 in length and 35 mm in diameter, made of porous sintered nickel-copper with a wall thickness of 150 micron. The tubular elements are arranged in two sections one of which is regenerated by reverse air blow and a rotating cylinder while the other one is used for dust separation. The

dust separating efficiency exceeds 99% for a dust fraction of 1-1.5 micron at an initial dust concentration of 0.8 g/cu m. A dust separator with a filtration surface of 1.6 sq m per zone can handle 1400 cu m air hourly.

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APTIC NO. 74065

Takagi, Toshimi and Mitsunobu Ogasawara

SIMULTANEOUS REDUCTION OF NO AND CO EMISSIONS BY TWO-STAGE COMBUSTION. (*Nidan nensho ni yoru NO, CO haishutsuryo no doji teigen*). Text in Japanese. *Nainen Kikan (Internal Combust. Engine)*, 14(2):9-15, 1975. (Special Issue.)

An experiment on two-stage combustion in a constant volume chamber was conducted to study nitric oxide and carbon monoxide emission characteristics. The combustion chamber was divided into a main chamber and sub-chamber and different mixed gases were supplied to each chamber. An electromagnetic shutter was equipped in the flow path connecting the two chambers. Propane, pre-mixed with air, was supplied and combustion was carried out by spark ignition. Combustion gases were collected in a Teflon bag with the aid of a diaphragm pump. Nitric oxide was analyzed by the chemiluminescence method while hydrogen, oxygen, CO, nitrogen, carbon dioxide, and hydrocarbon were analyzed by gas chromatography. Results showed that the formations of NO and CO depended greatly on the equivalent ratio. The equivalent ratio that gave maximum NO concentration was greater (more diluted) than the average equivalent ratio. The formations of NO and CO in the sub-chamber were the most decisive. Test results revealed that application of two-stage combustion to gasoline engines significantly reduced the concentrations of NO, CO, and HC in the exhaust.

51333

APTIC NO. 74098

Takano, A., T. Sakano, and Y. Hasegawa

RECENT ASPECTS IN DEVELOPMENT OF WET TYPE FLUE GAS DENITRIFICATION TECHNIQUES FOR STATIONAL SOURCES BY WET METHOD IN JAPAN. (*Shishiki haen dassho gijutsu kaihatsu no susei*). Text in Japanese. *Nenryo Kyokaishi (J. Fuel Soc. Japan (Tokyo))*, vol. 1975:239-249, April 1975. 7 refs.

Processes for flue gas denitrification currently being developed by more than 30 companies are described. A nitric acid manufacturing process developed by Mitsubishi Heavy Industries Co. oxidizes nitric oxide to nitrogen dioxide or nitric anhydride followed by washing with water or alkali. Test results for the treatment of 20,000 N cu m/hr LGN combustion flue gas showed more than 90% removal of nitric oxide. An alkali absorption method developed by Kawasaki Heavy Industries Co. removes dusts and desulfurizes before oxidation and denitrification by washing with magnesium hydroxide. The process was tested for 5000 N cu m/hr coal combustion flue gas. A liquid phase reduction method developed by Kyowa Chemical Engineering Co. treats the flue by triple washings with alkali, alkali and hydrogen peroxide, and sodium sulfide solutions. A liquid oxidation method by Mitsubishi Metal Co. uses potassium permanganate weak alkaline solution for denitrification and desulfurization. The process results in more than 90% denitrification and desulfurization, and more than 98% of the manganese dioxide is recovered as KMnO₄. A complex formation technique uses sodium acetate for desulfurization, calcium carbonate for primary denitrification, and sodium sulfite plus catalyst for secondary denitrification.

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APTIC NO. 73896

Terai, Akira

ADSORPTION SYSTEM OF EXHAUST GAS TREATMENT FOR ORGANIC SOLVENT TO CONTROL POLLUTION. (*Yuki yozai no haiki shori ni okeru kyuchaku hoshiki ni yoru shoriho*). Text in Japanese. *Shikizai Kyokaishi (J. Japan Soc. Color Mater.)*, 48(2):106-125, Feb. 1975.

A general discussion is given on treatment of organic solvents by adsorption. Physical adsorbents include hydrophobic activated carbon and hydrophilic silica gel, alumina gel, molecular sieve, and zeolite and chemical adsorbents include ion exchange resin, alkaline gas adsorbents such as sulfonated carbon, and acidic gas adsorbents such as Chemetron. Activated carbon usually possess 700 to 1500 sq m/g specific surface area depending on materials. It is used for solvent recovery, deodorization, and decolorization. A single adsorbing tower is used for alternative adsorption and desorption while multi-adsorbing towers are used for continuous adsorption and desorption. Wet type desorption uses water vapor to remove the adsorbed organic solvents followed by condensation and separation of the organic solvents and water by using a separating tower. Semi-dry type desorption uses heat to evaporate the adsorbed organic solvents followed by condensation and separation. The less common method is dry type desorption which removes organic solvents by using inert gases heated to a desired temperature.

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APTIC NO. 73824

Todo, Hisayuki

REMOVAL TECHNIQUE OF NITROGEN OXIDES IN FLUE GAS DISCHARGED BY STATIONARY COMBUSTION EQUIPMENT. (*Kotei nensho sochi hai gasu chu no chisso sankabutsu jokyoho*). Text in Japanese. *Tokyo Kogyo Shikensho Nyusu (News Govt. Chem. Ind. Inst., Tokyo)*, 9(6):141, 1975. 10 refs.

A general discussion is given on the research on nitrogen oxides prevention methods for fixed combustion facilities. Dry methods for NO_x removal include catalytic decomposition, catalytic reduction, adsorption, and absorption (molten salt method), and wet methods include absorption by alkali and by sulfuric acid, oxidation-absorption, complex salt formation, and the reduction method. Development of an active catalyst for nitric oxide decomposition is difficult due to the retardation of NO adsorption by the existing oxygen. The Hitachi Co. has improved the nonselective catalytic reduction method of the Chevron Research Co. for simultaneous reductions of sulfur dioxide and NO_x by consuming the residual oxygen with a carbon monoxide producing device and by eliminating SO₂ with manganese oxide-ferrous oxide before denitration. The Princeton Chemical Research Company a selective reduction method utilizes hydrogen sulfide at 120-150 degrees for simultaneous SO₂ and NO_x reductions. One problem with this process was the deactivation of catalysts by the resulting sulfur. An alternative was to use ammonia as the reduction agent. Dry adsorption and absorption were found extremely difficult because usually more than 95% of the total NO_x was NO which is not easy to adsorb or absorb. A proposed wet absorption method by Tyco Laboratories uses sulfuric acid to react with NO and nitrogen dioxide, forming nitrosyl sulfate.

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APTIC NO. 75344

Wen, C. Y., W. J. McMichael, R. D. Nelson, Jr., J. B. Berkowitz, D. Shooter, J. M. Ketteringham, L. N. Davidson, and K. M. Wiig

SCALE CONTROL IN LIMESTONE WET SCRUBBING SYSTEMS (FINAL REPORT). West Virginia Univ., Morgantown and Little (Arthur D.), Inc., Cambridge, Mass., Environmental Protection Agency Contract 68-02-1013, Program Element 1AB013, ROAP 21ACY-038, Rept. EPA-650/2-75-031, C-75092, 97p., April 1975. 16 refs.

NTIS: PB 243 309/AS

Factors affecting scaling in limestone wet scrubbing systems were studied along with the effectiveness of various anti-scaling additives. Calnox 214 DN and Calgon CL-14 both reduced the rate of sulfate scaling by 75%. Studies of the kinetics of calcium sulfite oxidation in calcium carbonate/sulfite slurries revealed that the rate of oxidation is proportional to bisulfite ion concentration and increases in the presence of solid calcium sulfite. The rate of sulfite dissolution was a contributing factor to the oxidation under normal operating conditions. Cal-

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cium sulfite scale was minimized by limiting the addition of calcium carbonate to control the pH at the scrubber inlet to below 6.0. Operation at reduced pH, however, reduced sulfur dioxide removal efficiency by 15-20% in a bench scale rubber. Operation at the lowest practicable temperature also reduced calcium sulfite scaling which was three times higher at 125 F than at 100 F. (Author conclusions modified)

51337

APTIC NO. 73771

Yoshida, Takashi

EXHAUST GAS CONTROL FOR LPG OPERATED AUTOMOBILE. (LPG sha no haishutsu gasu taisaku). Text in Japanese. Nainen Kikan (Internal Combust. Engine), 14(2):72-78, 1975. (Special Issue.)

Commercial LPG (liquefied petroleum gas) contains about 11% propane, 29% isobutane, 46% n-butane, and other low hydrocarbons. Exhaust gas from an LPG engine consists mainly of methane and ethane and the minimum gas temperature at the entrance to oxidation catalysts is 450-500 deg for 85-90% conversion, as compared to 270-300 deg for a gasoline engine. Similar to gasoline engines, exhaust gas recirculation is used as a measure for nitrogen oxides reduction in LPG engines. At 10-modes, 0-40 km/hr acceleration, no significant change of carbon monoxide concentration was observed, which is contrary to what is observed with a gasoline engine. Effects of fuel composition on the exhaust were studied by using 5% propane, 30% propane, and 99% propane gas. The concentration of CO in the exhaust increased in the order of 99% propane, 30% propane, and 5% propane fuel. The same trend was observed for HC concentration in the exhaust. The NOx concentration increased in the order of 5% propane, 30% propane and 99% propane.

51338

APTIC NO. 71884

Environmental Protection Agency, Research Triangle Park, N. C., Technology Assessment and Evaluation Branch

THE PETRO ELECTRIC MOTORS HYBRID VEHICLE (FEDERAL CLEAN CAR INCENTIVE PROGRAM CANDIDATE VEHICLE). Preprint, 23p., Jan. 1975.

Fuel economy and emissions tests were conducted by the Environmental Protection Agency on a Petro Electric Motors internal combustion engine/battery hybrid system installed in a 1972 Buick Skylark. The original internal combustion engine was replaced by the PEM hybrid system consisting of a 70 cu in. Mazda rotary engine and thermal reactor, electric dynamotor, and speed control circuits. Three phases of separate testing (Federal Test Procedure and EPA Highway Cycle) were performed at different times, and the vehicle demonstrated exhaust emission levels of 0.41, 3.4, and 1.0 g/mi for hydrocarbons, carbon monoxide, and nitrogen oxides, respectively, during 40 mi of testing in its last test configuration. A deterioration factor was not established. The vehicle cannot be driven by an inexperienced driver over an arbitrary route since there are no automatic provisions for battery control.

51339

APTIC NO. 71885

Environmental Protection Agency, Research Triangle Park, N. C., Control Systems Lab.

THE EPA-VAN. Preprint, 3p., 1975 (?).

An energy-saving, pollution-free, home energy system installed in an Environmental Protection Agency mobile research van is described. The system is composed of solar energy collectors, fuel cells, a heat pump system, catalytic appliances, and an energy storage system to provide all the energy needed for heating, cooling, lighting, cooking, and hot water heating. The primary source of heat is the energy absorbed by solar collectors which in turn is used to heat water. The energy in the heated water is used directly for room heating or is stored as heat for later use. The stored energy is extracted from the water by a heat pump. The latter also utilizes the outside air as a heat source. All electricity for the EPA van is produced by two fuel cells which electrochemically combine a gaseous fuel

and air to produce electricity, clean water, and heat that is utilized in the winter for room heating. The appliances are equipped with catalytic burners; the only by-product of the latter is water.

51340

APTIC NO. 72014

California Coastal Zone Conservation Commission, San Francisco

ENERGY ELEMENT FINDINGS AND POLICIES: 59. METHANOL; 60. ENERGY STORAGE TECHNIQUES AND APPLICATIONS; 10. ENCOURAGE CONSIDERATIONS OF ALTERNATIVE ENERGY SOURCES AND ENERGY SELF-SUFFICIENT DEVELOPMENT (EXCERPTS FROM THE REVISED DRAFT OF THE SIXTH PLAN). Preprint, p. 135-146, Jan. 4, 1975.

The environmental effects of alternative energy sources for automobiles and electric power production are discussed. Up to 15% methanol can be added to commercial gasoline in cars now in use without having to modify the engine. The mixture results in higher octane ratings, reducing the need for lead and lower exhaust emissions. When methanol was burned in a full scale boiler, no particulates were released from the stack and the amount of nitrogen oxides and carbon monoxide was less than the amount emitted from natural gas and oil. There were no sulfur compounds, and the amount of aldehydes, acids, and unburned hydrocarbons were negligible. Fuel cells can produce electrical energy at higher efficiencies than conventional fossil fuel-fired power plants, and without the air pollution. Hydrogen is a fuel gas that can be burned directly with almost no air pollution and might used as a substitute for natural gas to fuel electric power generators and to power automobiles. A California policy was recommended to ensure adequate supplies of energy while minimizing the adverse environmental impact of conventional energy production and which includes a tax incentive for using low or non-fossil fuel energy systems. Position statements were adopted on alternative energy sources and alternative energy resources.

51341

APTIC NO. 74198

Thermal Power Engineering Society of Japan, Kanto Branch

SUMMARY REPORT ON THE DUST COLLECTION EQUIPMENTS. (Shujin sochi chosa hokoku). Text in Japanese. Karyoku Genshiryoku Hatsuden (Therm. Nucl. Power), 26(5):585-587, March 1975.

The results of inspection of dust collection equipment at electric power plants is summarized. Fifty power plants were selected for this inspection. The type and the capacity of the dust collectors, the apparatus for treatment of the collected dust, method of disposition of dust, the capability of the collector, and the maintenance of those facilities are discussed. Dry electrostatic (EP) and/or centrifugal (MC) dust collectors are used depending on the capacity and the fuel which is used in the boiler. For boilers of coal and/or heavy oil, EP and MC are used jointly. For heavy oil and/or natural gas boilers, EP has sufficient capacity to collect pollutants. Eighty percent of the collected dust is used as raw material for reproduction and 20% is used as filler for land reclamation. Performance tests of the facilities are carried out 6-7 times per year in 80% of plants.

1974

51342

APTIC NO. 68222

Alperstein, M., G. H. Schafer, and F. J. Villforth, III.

TEXACO S STRATIFIED CHARGE ENGINE - MULTIFUEL, EFFICIENT, CLEAN, AND PRACTICAL. Preprint, Society of Automotive Engineers, New York, 13p., 1974. 9 refs. (Presented at the Society of Automotive Engineers, Southern California Section, May 14, 1974, Paper 740563.)

Fuel economy and exhaust emission results are presented for Texaco s stratified charge engine combustion concept, the

Texaco Controlled-Combustion System (TCCS), which was tested on M-151 army vehicles, one having a naturally aspirated L-141 TCCS engine and the other having a turbocharged L-141 TCCS engine. The TCCS conversions result in inherently low exhaust emissions, multifuel capability, and improved fuel economy over the normally carburetted L-141 gasoline engine. Promulgated federal gaseous exhaust emission standards can be met with the naturally aspirated TCCS engine-powered M-151 vehicle equipped with exhaust gas recirculation and a Texaco-developed exhaust catalyst. Environmental Protection Agency test results for average hydrocarbon, carbon monoxide, and nitrogen oxide emissions from the naturally aspirated TCCS engine are 0.30, 0.67, and 0.34 gpm, respectively, after 50,000 miles. Average emissions of hydrocarbons, CO, and NOx for the turbocharged TCCS engine with full emission controls are 0.35, 1.41, and 0.35 gpm, respectively. Data are also provided for emissions under varying degrees of control.

51343

APTIC NO. 68120

Anderson, J. G.

THE ENERGY DILEMMA. *Automotive Des. Eng.*, vol. 13:12-13, July/Aug. 1974. 4 refs.

The need for energy conservation is tempering demands for automotive exhaust emission control. With the current need to maximize gasoline production, demands to tailor gasoline quality for emission controls should be reassessed. In the past, anti-knock quality of gasoline has been improved, the cost of producing high octane fuel has been justified in a reduction of cost/mile, and compression ratios that gave the best economy were used. A sensible balance between compression ratios and octane number was reached about a decade ago. If compression ratios are raised above 10:1, mechanical problems might arise and further improvements in gasoline quality will be impossible. Improved anti-knock quality and removal of lead could increase cost and reduce yield of gasoline. Generally, gasoline yield is inversely proportional to the amount of upgrading involved in the refinery process. Lead traps and cyclones could be used to remove lead emissions without decreasing gasoline yield. If lead is reduced to low levels or removed, both Research and Motor octane numbers will have to be reduced, or the cost will increase and gasoline yield will decrease. Compression ratios may have to be reduced to cope with lower octane, with adverse effects on economy. Engine design changes such as improved carburetion, better manifold design, and high compression ratios for high thermal efficiency can be used to remove carbon monoxide and hydrocarbons. Recirculation of exhaust to reduce nitrogen oxides is wasteful, and the use of thermal reactors should be avoided since it increases fuel consumption. Doubts about catalyst durability and safety and increased costs and fuel consumption occur with catalytic converters.

51344

APTIC NO. 68139

Bilbrey, J. H., Jr., K. C. Dean, and J. W. Sterner

DESIGN AND OPERATION OF AN AUTOMOBILE AND RAILROAD CAR INCINERATOR. *Preprint, American Inst. of Mining, Metallurgical, and Petroleum Engineers, New York, Metallurgical Society*, 7p., 1974 (?). (Presented at the American Institute of Mining, Metallurgical, and Petroleum Engineers, Metallurgical Society, 1974, Paper A74-88.)

A low-cost, smokeless automobile incinerator capable of burning up to 80 flattened automobiles in an 8-hour operating day was designed and operated over the past 4-years. Based upon the successful operation of this prototype, a modified incinerator capable of burning both railroad cars and automobiles was designed and constructed by a major scrap processor. Research on the operation of the incinerator was conducted during the past year, burning flattened and unflattened automobiles in a stock, box, and work railroad cars. Although many maintenance problems were encountered from the materials of construction, operation of the incinerator was suc-

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cessful. Smokeless incineration of railroad cars and automobiles was possible in 23 of 25 tests made in the late stages of operation. Smoke emission in the other two burns was of less than 2-minute duration in each case. The average time for burning a batch of 20 unflattened automobiles was about 35 minutes, and the railroad cars ranged from between 60 and 75 minutes each for complete burnout. (Author abstract)

51345

APTIC NO. 75176

Brown, R. F.

PARTICULATE COLLECTION STUDY, EPA/TVA FULL-SCALE DRY LIMESTONE INJECTION TESTS (FINAL REPORT). *Research-Cottrell, Inc., Bound Brook, N. J., Cottrell Environmental Systems, Inc., Environmental Protection Agency Contract CPA 22-69-139, Program Element 1AB013, ROAP 21ACY-016, Rept. EPA-650/2-74-053, 9606, 207p., June 1974. 14 refs.*

Field tests to evaluate a mechanical cyclone/electrostatic precipitator particulate control system on the Tennessee Valley Authority's Shawnee number 10 boiler with and without the injection of dry limestone into the boiler for sulfur dioxide removal were conducted. Cyclone performance did not vary substantially with limestone injection; efficiencies remained about 50-60%. Electrostatic precipitator performance was adversely affected by dry limestone injection, however. An increase in electrostatic precipitator size of 45% was estimated as necessary to maintain baseline particulate emissions with coarse limestone at a precipitator operating temperature of 309 F. Reducing the temperature to 250 F allowed baseline emissions to be maintained with a 17% increase in size. Size increases of 225% and 56% at 309 F and 250 F, respectively, were estimated as necessary with fine limestone injection. A cold (250 F) electrostatic precipitator appeared to be the best option on a cost basis for a grass-roots plant.

51346

APTIC NO. 75150

Calvert, Seymour, Indrakumar L. Jashnani, Shuichow Yung, and Samuel Stalberg

ENTRAINMENT SEPARATORS FOR SCRUBBERS - INITIAL REPORT. *A.P.T., Inc., Riverside, Calif., Environmental Protection Agency Contract 68-02-0637, Program Element 1AB013, ROAP 21ACX-086, Rept. EPA-650/2-74-119-a, 318p., Oct. 1974. 73 refs.*

NTIS: PB 241189/AS

An evaluation of present entrainment separator technology for gas scrubbers was performed along with an experimental and theoretical studies of separator characteristics. A pilot plant with 85 cu m/min maximum capacity was built; and experiments were performed on zigzag baffle, knitted mesh, tube bank, packed bed, and cyclone devices. A theoretical model developed to determine primary collection efficiency for zigzag baffles agreed fairly well with experimental results. The overall collection efficiency in zigzag baffles was increased by staggering the baffles, and the pressure drop was reduced by keeping 1-3 cm distance between rows. The mechanism of reentrainment in zigzag baffles was tearing of the liquid sheets caused by high gas velocities and shattering of liquid drops, whereas reentrainment mechanisms in packed bed and mesh pad devices were shattering of drops and rupture of bubbles. Although mathematical models for primary collection efficiency are satisfactory, useful reentrainment models are not yet available. (Author conclusions modified)

51347

APTIC NO. 74211

Chiba, Junji

PROPERTIES OF GYPSUM FROM FLUE GAS DESULFURIZATION-MINUTE CONSTITUENTS. (*Haien datsuryu sekko no seijo - shu to shite biryo seibun ni tsuite*). Text in Japanese. *Preprint, Japan Agency of Science and Technology, Pollution and Resources Research Inst.*, p. 45-48, 1974. (Presented at the Japan Agency of Science and Technology, Pollution and Resources Research Institute Study Meeting, 3rd, Kawaguchi, Japan, July 9-10, 1974.)

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Trace constituents in four types of gypsum from flue gas desulfurization, six types of natural gypsum, and nine types of chemical gypsum were determined by emission spectroscopy and were compared with samples of limestone and residual oil ash. A total of 28 elements were determined in desulfurization gypsum and included silicon, aluminum, vanadium, lead, barium, iron, magnesium, strontium, sodium, nickel, potassium, chromium, titanium, copper, cadmium, cobalt, indium, boron, molybdenum, antimony, tin, thallium, and zinc.

51348

APTIC NO. 74288

Chwalibog, Henryk

PROBLEMS OF AIR POLLUTION WITH SULFUR COMPOUNDS. (Problemy zwiqzane z zanieczyszczaniem atmosfery zwiqzkami siarki). Text in Polish. *Chemik*, 27(2):38-44, 1974. 11 refs.

Quantitative data concerning air pollution by sulfur compounds, industrial pollution sources, and control methods and costs are discussed. Sulfur dioxide quantities are projected to increase from 1965 to 1980 by 34%, i.e., 2.3%/yr, while the production of sulfuric acid is expected to increase by 187%, i.e., 12.4%/yr. In highly industrialized countries, fuels are utilized mostly by power stations (46%); households consume 22%. Dry, wet, and catalytic methods of sulfur dioxide control are described. Such methods applied to power stations can provide additional sulfuric acid without the investment in new sulfuric acid plants. Data from western countries indicate that investments are approximately 20% lower when both power stations and desulfurization installations are built at the same time.

51349

APTIC NO. 74021

Coon, C. W.

TECHNOLOGICAL IMPROVEMENTS TO AUTOMOBILE FUEL CONSUMPTION. VOLUME I: EXECUTIVE SUMMARY (FINAL REPORT). Southwest Research Inst., San Antonio, Tex., Dept. of Automotive Research, Department of Transportation and Environmental Protection Agency Contract DOT-TSC-628, Work Unit OS514/R5523, Rept. DOT-TSC-OST-74-39.1, 12p., Dec. 1974.

NTIS: PB 238677

A preliminary survey of the technological feasibility of reducing automobile fuel consumption by 30% while maintaining 1976 Interim Standards for carbon monoxide, hydrocarbon, and nitrogen oxide emissions was performed. The reference vehicle was a standard 1973 automobile having a 350 cu in. engine and a curb weight of 4300 lb. Evaluation of individual improvements led to three synthesized vehicle designs: a conventional spark ignition engine with electronic fuel injection, a catalytic reactor, spark advance control, and exhaust gas recirculation; a stratified charge engine with a catalytic reactor and possibly exhaust gas recirculation; and a turbocharged diesel engine.

51350

APTIC NO. 75128

Craig, J. W. T., G. L. Johnes, Z. Kowszun, G. Moss, J. H. Taylor, and D. E. Tisdall

CHEMICALLY ACTIVE FLUID-BED PROCESS FOR SULPHUR REMOVAL DURING GASIFICATION OF HEAVY FUEL OIL - SECOND PHASE. Esso Research Centre, Abingdon, Berkshire (England), Environmental Protection Agency Contract 68-02-0300, Program Element 1AB013, ROAP 21ADD-BE, Rept. EPA-650/2-74-109, 599p., Nov. 1974. 2 refs.

NTIS: PB 240632/AS

Studies of the Chemically Active Fluid-Bed Process for the desulfurizing gasification of heavy fuel oil in a bed of hot lime are reported. Batch tests confirmed that United States limestone BCR 1691 produces more dust during startup than the purer Denbighshire or United States BCR 1359 stones. The use of BCR 1691 resulted in 10 times more dust during

kerosene combustion at 870 C than during gasification/regeneration. Pilot plant runs totalling 332 gasification hours indicated that sulfur removal efficiency was comparable for Denbighshire and BCR 1691 stones, ranging from 60-95%. A poor sulfur material balance illustrated the need for improved analytical procedures. Total CAFE development through a large demonstration test is expected to take 6-7 yr and require \$3,320,000 in engineering effort. (Author abstract modified)

51351

APTIC NO. 74229

Davidson, J. M., M. K. Malu, J. K. Tien, J. Tabock, and N. A. Gjostein

OXIDATION AND HEAT RESISTANT ALLOYS FOR EMISSION CONTROL EXHAUST SYSTEMS. Preprint, Society for the Advancement of Material and Process Engineering, 10p., 1974. 11 refs. (Presented at the Society for the Advancement of Material and Process Engineering Technical Conference, National, 6th, Dayton, Ohio, Oct. 8-10, 1974.)

Candidate car emission control exhaust hardware alloys were investigated for their oxidation resistance from both theoretical and experimental viewpoints. The cyclic oxidation and the oxide spallation behavior of these constitutionally complex alloys can be predicted with minimal experimental input by an extension of the scientific principles of oxidation and oxide spallation. The fundamentals of thermodynamics, kinetics, and mechanics, combined with a knowledge of alloy chemistry and oxidation environment, can lead to general guidelines for the selection and design of alloys for thermal cyclic applications. These analytical predictions of alloy oxidation behavior are applied to many candidate austenitic and ferritic stainless steels, and are in agreement with laboratory and actual automobile engine test results. (Author abstract modified)

51352

APTIC NO. 69446

Dunn, H. S. and P. H. Wojciechowski

ENERGY STORAGE AND CONVERSION EFFICIENCY IN A HYDRAULIC/GAS-TURBINE HYBRID. Preprint, American Society of Mechanical Engineers, New York, 16p., 1974. 6 refs. (Presented at the American Society of Mechanical Engineers, Gas Turbine Conference and Products Show, Zurich, Switzerland, March 30-April 4, 1974, Paper 74-GT-107.)

An energy storage system having a limited capacity is described which can remove the burden of acceleration from the vehicle prime mover in typical urban driving situations and provide an efficient regenerative braking system to significantly increase fuel economy over stop-start driving schedules. Energy is stored in a hydraulic accumulator which is an integral part of a hydraulic transmission. Data from laboratory tests are presented to indicate achievable energy conversion efficiencies. Computer simulation of various size vehicles being driven over typical urban-suburban driving schedules is used to estimate the reduction in vehicular emissions and energy consumption resulting from the energy storage capability. The average increase in fuel consumption with the OC-70 system was 25%, while the average increase for the SSS-12 was 20%. The emissions/vehicle mile decreased substantially with the use of the hydraulic system with two minor exceptions. For the OC-70, carbon monoxide increased slightly by about 1-2%, while the emissions of unburned hydrocarbons and nitrogen oxides decreased on the average of 14 and 30%, respectively. For the SSS-12, a 50% reduction in CO was observed, HC increased by about 3%, and NOx decreased by 25%. (Author abstract modified)

51353

APTIC NO. 68081

Eatock, H. C., J. C. Plucinsky, and J. A. Saintsbury

DESIGNING SMALL GAS TURBINE ENGINES FOR LOW NOISE AND CLEAN EXHAUST. *J. Aircraft*, 11(10):616-623, Oct. 1974. 8 refs. (Presented at the Canadian Aeronautics and Space Inst./American Inst. of

Aeronautics and Astronautics Aeronautical Meeting, Montreal, Canada, Oct. 29-30, 1973, Paper 73-1154.)

Preliminary results of design studies involving the use of small gas turbine engines to reduce noise and exhaust emissions from aircraft are reviewed. Comparisons of reciprocating engines with small turboprop engines indicate lower carbon monoxide and hydrocarbon emissions for the latter engine type at all power settings. The piston engines show somewhat lower nitrogen oxide production above 20% power, consistent with the fuel-rich operation of such engines. Small gas turbine engines have higher CO and unburned hydrocarbon emissions at low power and lower NOx levels at higher power than large gas turbines. The comparatively poor performance of the small engines at low power is due primarily to operation at low combustor pressure and temperature as well as to a high ratio of combustor surface area to volume and to the use of relatively simple and low-cost combustor and fuel systems. The good NOx performance at high power is due principally to lower levels of combustor inlet pressure and temperature. Early development data indicate that major reductions in CO and unburned hydrocarbons can be achieved with only small increases in NOx by means that do not imply appreciable changes in the size, weight, or complexity of the gas turbine engines.

51354

APTIC NO. 74068

Fukuda, Yoshio

NOX REMOVAL FACILITY, MON PROCESS. (NOx jokyo setsubi, mon procesu). Text in Japanese. Jitsumu Hyomen Gijutsu (Pract. Surf. Technol.), no. 244:49-52, May 1974.

A newly developed process for nitrogen oxides removal is described. The MON process, named for Mitsubishi Kizoku, Okabe of Tohoku Univ., and Nippon Kagaku, uses potassium permanganate as an oxidizing agent. Potassium permanganate in alkaline solution converts nitric oxide into nitrate and nitrogen dioxide into nitric acid. The resulting MnO2 is easily filtered and recovered as material for the manufacturing of KMnO4. Contrary to the conventional methods, the NOx conversion rate increases with increasing temperature. Test results at a pilot plant showed that NOx was reduced from 570 ppm (nitric oxide 520 ppm) to 27 ppm (mostly NO) at 97-98% conversion. Another advantage of the process is that other acidic gases such as sulfur dioxide are also removed.

51355

APTIC NO. 73938

Gel perin, N. I., V. A. Liferenko, V. Z. Grishko, V. I. Sokolov, and A. T. Eremin

MASS-EXCHANGE CHARACTERISTICS OF A PILOT PLANT ABSORBER WITH FLUIDIZED-BED SPHERICAL PACKING FOR REMOVING PHENOL FROM GASEOUS STREAMS. (Issledovanie massoobmennyykh kharakteristik pilotnogo absorbera s psevdoozhizhennoy nasadkoy pri ochistke gazov ot fenola). Text in Russian. Khim. Promy. (Moscow), no. 12:45-47, 1974. 5 refs.

Mass exchange processes were studied in a fluidized-bed absorber filled with polyethylene balls 30 mm in diameter regarding the adsorption of phenol from waste gases. The phenol concentration ranged from 400 to 2000 mg/cu m at a gas temperature of 30-40 C and a gas flow rate of 1.5-4.5 m/sec. The absorber, designed for a capacity of 6500 cu m/hr was 700 m in diameter, and 8.5 m in height. A 15% solution of sodium hydroxide was used as an absorbent liquid. Practically quantitative absorption of phenol was observed. The efficiency of the separation increased with increasing gas flow rate and absorbent expenditure, especially with increasing static layer height.

51356

APTIC NO. 72121

Gulacsy, Bela, Erno Luptak, and Ferenc Taller

INFLUENCE OF CENTRAL HEATING PLANTS ON AIR QUALITY. (Futoeromuvek letesitesenek hatasa a

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levegőtisztaságra). Text in Hungarian. Energiagazdalkodás, 15(10):444-449, Oct. 1974. 7 refs.

Effects of heating power plants on air quality are described. Domestic and institutional heating equipment with their low-level emission sources are chiefly responsible for sulfur dioxide, dust, soot, and nitrogen oxides emissions in urban agglomerations. While flue gas desulfurization is presently unfeasible, fly ash and dust can be separated by electrostatic precipitators. Although a switch to low-sulfur or no-sulfur fuels substantially reduces the SO2 emissions, the adoption of remote heating by means of large-capacity heating power plants represents the best solution in the long run. Such power plants are able to dilute their emissions by the use of 200 to 300 m high stacks. Gas turbine type heating power plants are most advantageous ecologically as they use low-sulfur or no-sulfur fuels, and generate less nitrogen oxides than other power plant types. In addition, the nitrogen oxides are diluted by cooling air a great degree, which permits the use of lower stacks. The nitrogen oxides emission can be further reduced by the injection of steam rates over 1.3%.

51357

APTIC NO. 73920

Hardenberg, H. and V. Rubi

METHANE-POWERED ENGINES FOR COMMERCIAL VEHICLES AND BUSES. (Methangasmotoren fuer Nutzfahrzeuge und Omnibusse). Text in German. VDI (Ver. Deut. Ingr.) Ber., no. 224:67-78, 1974. 3 refs.

Engineering and environmental aspects of the use of methane as a fuel for commercial vehicles and buses are described. Comparative emission tests revealed lower carbon monoxide, hydrocarbon, and nitrogen dioxide emission levels from natural gas-powered engines than from diesel engines optimized for natural gas. However, natural gas engines emit much more CO at air-excess coefficients below 1.1, and therefore they cannot be used at full load in an environmentally acceptable manner. As demonstrated by experiments carried out by Mercedes Benz with an autobus, gaseous methane is not suitable even for short-range vehicles due to the short action radius and the substantial increase in weight. Experiments with liquefied methane were, however, successful.

51358

APTIC NO. 69255

Hayashi, Kiyoshige

AUTOMOTIVE EXHAUST CLEANER. (Jidosha no haiki gasu senjoki). Text in Japanese. (Assignee not given.) Japan. Pat. Sho 49-34897. 3p., Sept. 18, 1974. (Appl. Nov. 1, 1969, 1 claim).

An automotive exhaust gas cleaner designed for the removal of nitrogen oxides is described. A container packed with natural fiber such as cotton, wool, and silk or synthetic fiber such as rayon and nylon immersed in peptized animal or vegetable protein such as milk, egg white, and soy bean milk or molten or liquid nylon and dried is placed in the exhaust pipe somewhere between the muffler and exhaust gas outlet. The mechanism of NOx removal by this device is not clearly known, however, the NOx, particularly nitrogen dioxide, is presumed to react with nylon or protein in the presence of water and be captured on fibers. The shape or form of the container is not particularly specified as long as it is suitable for passing exhaust gas without much resistance. The NOx content in exhaust gas was reduced from 1200 ppm to 300-400 ppm after passing through this cleaner.

51359

APTIC NO. 75113

Henning, Kurt, Wayne Andreson, and James Ryan

IMPROVED AIR POLLUTION CONTROL FOR A KRAFT RECOVERY BOILER: RECOVERY BOILER NO. 4 (FINAL REPORT). Hoerner Waldorf Corp., St. Paul, Minn., Dept. of Mill Engineering, Environmental Protection Agency Contract 68-02-0247, Program Element 1AB013, ROAP 21ADC-061, Rept. EPA-650/2-74-071-b, 77p., Dec. 1974.

NTIS: PB 240442/AS

CONTROL METHODS

51365

Field tests to establish the levels of gaseous and particulate air pollutants discharged from a controlled-odor kraft recovery boiler with a nominal capacity of 1000 tons/day are described along with process variables affecting emission levels. The capital cost of the recovery system is \$11,253,000 and includes a black liquor evaporator concentrator and a dry bottom, high efficiency (99.7%) electrostatic precipitator. The recovery system is able to maintain sufficiently low emissions for both total reduced sulfur compounds and particulates so as to meet the Montana State Emission Standards of 17.5 ppm TRS and 52 lb/hr particulates (daily averages). Particulate emissions are primarily affected by and are directly proportional to the amount of black liquor solids burned in the recovery furnace. Both sulfur dioxide and total reduced sulfur emissions are affected by liquor sulfidity; emissions increase as sulfidity levels increase. (Author abstract modified)

51360

APTIC NO. 73924

Hicks, Peter, Bruno Javorsky, and Gunnar Elgstedt

ALFA AND ENVIRONMENTAL HYGIENE. THE FOAMATOR PROJECT. (A and O - Alfa och omgivningshygien Projektet FOAMATOR). Text in Swedish. *Kem. Tidskr.*, 86(10):42-44, 47, Oct. 1974.

The new Alfa Laval foam bed scrubber FOAMATOR and its industrial applications are described. The foam bed scrubber uses water with 0.1-0.2% foaming agent to generate a foam bed through which the gas to be cleaned is passed at a rate of 1.1 m/sec. The water consumption ranges from 1-10 l/1000 cu m gas. The pH of the foam bed may range from 3 to 12. The raw dust concentration in the waste gases to be cleaned should not be higher than 5 g/N cu m. The FOAMATOR is suitable for cleaning large quantities of waste gases from even finely dispersed dust, for the recovery of useful gases by separation their dust load, and for the recovery of particulates. The application of the foam bed scrubber for the removal of sulfur dioxide and dust from flue gases is being studied. In one foundry, the foam bed scrubber reduces the dust concentration to 27 mg/N cu m.

51361

APTIC NO. 73950

Husmann, K.

STATE OF THE ART IN THE USE OF THE AGS PROCESS FOR DESULFURIZATION OF WASTE GAS. (Neuester Stand der Untersuchungen bei der Anwendung des AGS-Verfahrens zur Entschwefelung von Rauchgasen). Text in German. *DECHEMA Monograph*, 75(1452-1485):125-130, 1974.

The AGC process for desulfurizing waste gases from sulfuric acid contact plants and oil-fired power stations is described. The gases are first cooled by a water spray to 100 C and then desulfurized by an aqueous absorption suspension of magnesium oxide and manganese oxides. The desulfurized gas is then passed into a lamellar separator and is heated before being released into the atmosphere. The absorption suspension is spray-dried such that the sulfur contents comprise 17-21% of the suspension and is then regenerated in vortex roasting furnaces. The gases from the furnace which contain sulfur dioxide in concentrations of 5-7% are passed through a cyclone separator and are cooled from 900 to 350 C. Final purification of the gases is achieved with an electrostatic precipitator before liquid recovery is achieved.

51362

APTIC NO. 69215

Ichikawa, Michio

STEPS TO A CLEAN ENVIRONMENT. (Seijo na kankyo kaifuku eno teigen). Text in Japanese. *Kagaku Kojo (Chem. Factory)*, 18(11): 58-59, 1974.

The future environment was considered both from the points of limited quantity of natural resources and pollution. A cleaner environment could be attained at the expense of larger consumption of natural resources, while lesser fuel consumption could be achieved at the expense of a polluted environ-

ment. To compromise between these alternatives the establishment of a central steam supplying system was suggested for an industrial area. The incineration facilities as well as power plants were situated in the same location, and their excess steam and heat would be utilized for the central steam supplying system. The air pollution caused by these facilities may then be treated by one large facility for air pollution control. Public awareness of environmental pollution should begin with early education.

51363

APTIC NO. 74186

Il'inskiy, V. A. and A. D. Al'ter

SMOKE CAPTURE SYSTEMS OF REGENERATIVE GLASS-SMELTING FURNACES. (Sistemy dymoudaleniya regenerativnykh steklovarenykh pechey). Text in Russian. *Steklo Keram. (Glass Ceram.)*, no. 9:23-26, Sept. 1974. 3 refs.

Modern smoke capture systems for regenerative glass-smelting furnaces are described. Systems with central smoke ducts are recommended for all cases where there is space for air communications and transfer ducts under the furnace. The combustion air shall be admitted separately for the individual zones in furnaces with multiple burners. As stacks of 60-80 m height are capable of producing natural draft at a smoke inlet temperature of 300-400 C, the regenerators shall be designed for a flue gas temperature of 500-550 C. The height and width of smoke ducts for glass-smelting furnaces have been standardized for different thermal capacities and for a flue gas temperature of 500 C, a flow speed of 5-7 m/sec, and an air intake coefficient of 1.35.

51364

APTIC NO. 68223

Jackson, Robert G.

THE ROLE OF METHANOL AS A CLEAN FUEL.

Preprint, Society of Automotive Engineers, Inc., New York, 6p., 1974. 5 refs. (Presented at the Society of Automotive Engineers, Mid-Continent Section, Oct. 27, 1973.)

Various coal gasification schemes as alternatives to the direct combustion of coal are reviewed, with particular emphasis on the use of methanol as a clean fuel. Among four alternative routes that can be taken following the gasification of coal so as to produce a synthesis gas which after cleanup can be converted to either gaseous or liquid products, only the solution refining or methanol process can produce a fuel usable over the whole range presently supplied by petroleum. Methanol has the additional advantage that it can be used without any further processing and be produced using available components from existing processes. Examples of possible methanol uses include: boiler fuel applications with little or no modification, gas turbine fuel applications where clean methanol combustion gives higher efficiency, vehicle fuel applications with slight modifications to the fuel system, fuel cell applications where the energy can be converted directly, application as a liquid petroleum gas alternate in isolated instances, and application as a source of synthetic natural gas for peak shaving. Estimates of investment and product cost based on existing technology indicate that methanol plants will be competitive with alternative energy sources.

51365

APTIC NO. 75132

Jahnig, C. E. and E. M. Magee

EVALUATION OF POLLUTION CONTROL IN FOSSIL FUEL CONVERSION PROCESSES. GASIFICATION; SECTION I: CO₂ ACCEPTOR PROCESS (FINAL REPORT). Exxon Research and Engineering Co., Linden, N. J., Environmental Protection Agency Contract 68-02-0629, Program Element 1AB013, ROAP 21ADD-023, Rept. EPA-650/2-74-009-d, GRU.6DJ.74, 67p., Dec. 1974. 19 refs.

NTIS: PB 241141/AS

The Carbon Dioxide Acceptor process for the gasification of lignite to pipeline quality gas is described. The process makes synthetic natural gas from lignite by gasifying it with steam at

1500 F and at 150 psig pressure. Heat is supplied indirectly by circulating dolomite which also takes up CO₂ and sulfur. After clean-up to remove dust and sulfur, the gas is methanated, giving it a heating value of 952 Btu/cu ft. Since the gas fed to the methanator possesses a high hydrogen content, it requires no shifting or CO₂ removal ahead of the methanation step. The gas is finally compressed and dried to meet pipeline requirements. Heat released from methanation can be recovered in the form of steam or can be used as preheat; thus no utility boiler is required to supply steam or power for the process during normal operation.

51366

APTIC NO. 69389

Johnson, R. T.

ENERGY AND SYNTHETIC FUELS FOR TRANSPORTATION: A SUMMARY. Preprint, Society of Automotive Engineers, Inc., New York, 12p., 1974. 55 refs. (Presented at the Society of Automotive Engineers, West Coast Meeting, Anaheim, Calif., Aug. 12-16, 1974, Paper 740599.)

Because of the fuel shortage, attention is being focused on possible substitute fuels for conventional gasolines and distillate-type fuels. The presently available synthetic or substitute fuels being considered for transportation uses are surveyed. Current energy use patterns in the transportation sector and projected future automobile and transportation modes are reviewed. Specialized fuels needs for the transportation sector are described including attributes of the ideal fuel. Possible synthetic fuels include hydrocarbons, hydrogen, inorganic hydrogen compounds, and electrochemical systems. The properties of an idealized synthetic fuel system are formulated and correlated with the properties of the ideal transportation fuel, and an extensive comparison of the selected synthetic fuel candidates is made. A significant portion of this comparative information is presented in graphical and tabular form with appropriate discussion of the data and its presentation. The application potentials of the various synthetic fuel candidates to various modes are described, including aviation and space, trains and other tracked vehicles, road-type vehicles, agricultural and construction vehicles, recreational vehicles, and small powerplants. Interim and long-term fuel possibilities are proposed for further consideration. (Author abstract modified)

51367

APTIC NO. 67869

Kant, F. H., R. P. Cahn, A. R. Cunningham, M. H. Farmer, W. Herbst, and E. H. Manny

FEASIBILITY STUDY OF ALTERNATIVE FUELS FOR AUTOMOBILE TRANSPORTATION VOLUME II-TECHNICAL SECTION. Exxon Research and Engineering Co., Linden, N. J., Office of Air and Waste Management Contract 68-01-2112, Rept. EPA-460/3-74-009-b, 236p., June 1974. 180 refs.

NTIS: PB-235 582/AS

Feasible and practical alternatives to automobile fuels derived from petroleum for the 1975-2000 time period are identified. The alternative fuels are liquids derived from domestic coal and oil shale, specifically, gasolines, distillates, and methanol. Initial production of the fuels is likely within the next 5-7 yr. The alternative fuels will begin to be used in conjunction with petroleum. Usage will expand as availability increases and the approach to complete replacement will be evolutionary. The individual fuels examined in detail differ in estimated cost but all may be producible at a cost level or range projected for petroleum fuels. Fuels were screened on the basis of economic, technical, and performance criteria, with consideration given to the way in which new fuel could be brought into general use. Consideration was given to the environmental impact of producing and using the fuels. Feasible and practical alternative automotive fuels were identified from a comprehensive list of initial possibilities. The shale derived fuels are projected to be cheaper than coal derived fuels over the entire timeframe of the study, but the quantitative develop-

ment of shale oil will probably be limited environmentally and by other resources. The safety, toxicity, reliability, compatibility with different engines, and convenience of use were also considered. (Author summary modified)

51368

APTIC NO. 69467

Karim, G. A., M. Rashidi, and M. Taylor

AN ANALYTICAL STUDY OF THE COMPRESSION IGNITION CHARACTERISTICS OF H₂-O₂-N₂ MIXTURES IN A RECIPROCATING ENGINE. *J. Mech. Eng. Sci.*, 16(2):88-94, 1974. 19 refs.

Chemical kinetic data were used to model the combustion of hydrogen-oxygen-nitrogen mixtures in a reciprocating automobile engine in order to examine the effects of various operating variables on the production of nitrogen oxides from air-breathing, hydrogen fueled internal combustion engines. Although negligible amounts of NO_x were formed during compression and prior to the period of rapid heat release, concentrations rapidly increased once ignition occurred. These NO_x concentrations tended to remain around the values associated with the peak temperature and showed only very minor changes during expansion. Most of the NO_x observed were in the form of nitric oxide. Concentrations of NO_x for all cases involving compression ignition and homogeneous operation were reasonably well correlated logarithmically with peak cycle temperature. Oxygen addition for any constant equivalence ratio led to increased NO_x production associated with this temperature effect. Nitrogen oxide production was not reduced to that achieved with air until an oxygen index value of around 0.90 was employed. Nitrogen addition to the air, however, was more effective in reducing NO_x, primarily because of reduced peak temperatures.

51369

APTIC NO. 74214

Kasaoka, N., H. Kobayashi, and H. Nagisa

NOX DRY PROCESS CATALYTIC REDUCTION BY CO IN NO_x-O₂-H₂O-N₂ SYSTEM. (NO_x-O₂-H₂O-N₂ keichi no NO_x no CO ni yoru kanshiki sesshoku kangen nit-suite). Text in Japanese. Preprint, Japan Society of Chemical Engineers, Tokyo, p. 107-108, 1974. 4 refs. (Presented at the Japan Society of Chemical Engineering Lecture Meeting, Akita, Japan, Aug. 28-29, 1974, Paper B-20.)

A catalytic process for the removal of nitrogen oxides from exhaust gas containing no sulfur oxides was investigated. Catalysts containing oxides of copper, aluminum, magnesium, and cobalt or nickel for the reduction of NO_x by carbon monoxide were superior to others in catalytic activity and selectivity. The conversion rates of nitric oxide to nitrogen in NO-CO-N₂ and NO-CO-water-N₂ systems were measured for 13 catalysts. In the case of the former system, the NO to N₂ conversion rate was in the range of 5.8-100%, while the NO to N₂ selectivity of the latter system was in the range of 51.4-100%. In the NO-CO-H₂O-N₂ system, formation of NH₃ was reduced to a negligible level at 500-550 C. In an NO-CO-oxygen-H₂O-N₂ system, the NO to N₂ selectivity increased with a decrease in the stoichiometric ratio of CO to O₂.

51370

APTIC NO. 73853

Kato, Hisashi and Kazuo Nambu

REINFORCED PLASTIC APPLICATIONS IN AIR POLLUTION CONTROL EQUIPMENT INCLUDING ELECTROSTATIC PRECIPITATORS. Preprint, Society of the Plastics Industry, Inc., Greenwich, Conn., Reinforced Plastics/Composites Inst., 7p., 1974. (Presented at the Society of the Plastics Industry, Incorporated Reinforced Plastics/Composites Institute, Annual Technical Conference, 29th, 1974.)

The use of fiberglass reinforced plastics in the construction of air pollution control equipment is discussed, with particular emphasis on their use in electrostatic precipitators. The corrosion resistance of fiberglass reinforced plastics makes them ideal for use in scrubbers and electrostatic precipitators. An

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electroconductive FRP laminate of 1-1000 ohms/cm resistance was developed by means of special resin formulations containing conductive fillers and special laminating techniques using conductive reinforcements. This development along with a fabrication technique for large collector electrode plates which possess little to no warp led to the construction of an all FRP electrostatic precipitator with a collection efficiency comparable to that of a stainless steel tube precipitator. The cost of FRP at the present is almost equivalent to 304 stainless steel. Overall, FRP is much more economical because it is virtually maintenance-free.

51371

APTIC NO. 74019

Kikuchi, Minoru, Takashi Mitamura, Hisayoshi Toratani, and Takafumi Midorikawa

EFFECT OF ZINC ON THE REACTIVITY OF CALCIUM CARBONATE TOWARD SULFUR DIOXIDE. (*Tansan karushumu to nisanka iou no hanna ni oyobosu aen no eikyo*). Text in Japanese. *Nippon Kagaku Kaishi (J. Chem. Soc. Japan)*, no. 5:835-840, May 1974. 8 refs.

The effect of zinc on the reactivity of both heavy and precipitated calcium carbonates toward sulfur dioxide was studied in a fixed bed. The calcination rate of each carbonate increased within 5 min after the addition of 1 wt% Zn at 800-1000 C. Heavy calcium carbonate showed a particularly enhanced calcination rate that reached 20-25% at 900-950 C within 2 min after the addition of Zn. The reaction of calcium carbonate with sulfur dioxide (15 vol% in air) at temperatures of 800, 900, and 1000 C resulted in conversion rates of 62.7, 80.0, and 81.4%, respectively, for heavy calcium carbonate and 10.1, 25.4, and 56.2%, respectively, for precipitated calcium carbonate. An increase in the conversion rate for heavy calcium carbonate was achieved by the addition of 1 wt% Zn at a temperature above the boiling point of Zn.

51372

APTIC NO. 75380

Kim, B., J. M. Genco, J. Oxley, and P. Choi

DEVELOPMENT OF INFORMATION FOR STANDARDS OF PERFORMANCE FOR THE FOSSIL FUEL CONVERSION INDUSTRY (FINAL REPORT). Battelle Memorial Inst., Ohio, Columbus Labs., Office of Air and Waste Management Contract 68 02-0611, Task 7, Rept. EPA-450/3-75-029, 158p., Oct. 1974. 44 refs.

NTIS: PB 242543/AS

Background information to assist the Environmental Protection Agency in preparing performance standards for the coal gasification industry is presented. Coal gasification processes considered include the Lurgi, Synthane, Hygas, and Carbon Dioxide-Acceptor processes for the production of substitute natural gas, and the Lurgi and Koppers-Totzek processes for the production of low-Btu utility gas. Processes generally considered capable of separate removal of sulfur compounds and CO₂ during SNG manufacture include the Rectisol, the Selexol, the Purisol, and the Alkacid processes. Commercially proven desulfurization processes for low-Btu utility gas manufacturing include the Stretford process and an amine-absorption process. Acid gases generated from fuel-gas purification can be sent to either the Claus process or the Stretford process for desulfurization and sulfur recovery. The Claus process produces a tail gas containing 1-2% sulfur dioxide after incineration. The Beavon, Cleanair, and Wellman-Lord processes appear capable of reducing the sulfur content of Claus-plant tail gas to 250 ppm SO₂. (Author summary modified)

51373

APTIC NO. 75286

Kizim, I. A. and A. N. Pyatigorskiy

EFFICIENCY OF HORIZONTAL ELECTROSTATIC PRECIPITATORS. (*Effektivnost gorizontol'nykh elektrofifil'nykh*). In: *Development of Methodology and Establishment of Efficiency of Industrial Dust Collection Equipment for Fine Particulate*. U. S./USSR Working

Group on Stationary Source Air Pollution Control Technology, U. S./USSR Environmental Agreement, Proj. A-4, Task 1, p. 1-7, Sept. 1974. Translated from Russian, 7p. (Also: *Energetik (Moscow)*, no. 10:12-13, 1973.) (Entire report of TR 104-75 processed under APTIC 70040.)

Two horizontal-type electrostatic precipitators were field tested for their fly ash collection efficiency at a coal burning power plant using 300 MW generating units. The initial efficiencies observed were well below the guaranteed figure of 99.5%, being 95 and 92.7%, respectively. The changeover to periodic precipitating electrode vibration at intervals determined in accordance with the amount of fly ash collected by the individual fields resulted in increased collection efficiency figures of 96.5 and 97.2%, respectively. In the former case (96.5% collection), a reduction in the flue gas temperature from 140 C to 122 C resulted in a further increase in collection efficiency to 98%. Similar results were obtained with the other precipitator. The resulting increased efficiencies were due to the lowered fly ash resistivity accompanying the reduced flue gas temperatures.

51374

APTIC NO. 74217

Kobayashi, Akira

INTERNAL COMBUSTION ENGINE EXHAUST GAS PURIFICATION DEVICE. (*Nainen kikan no haiki gasu joka sochi*). Text in Japanese. *Japan. Pat. Sho 49-28282*, 9p., July 25, 1974. (Appl. Nov. 30, 1968, 3 claims.)

An internal combustion engine exhaust gas purification device that operates by introducing metered amounts of oxygen and nitrogen to the engine air inlet is described. The device consists of the following: an air inlet duct with an air valve between the carburetor and the main fuel nozzle; a gas valve underneath the nozzle; oxygen and nitrogen suppliers controlled by an electromagnetic valve; an alternating distributor which is connected to the oxygen and nitrogen suppliers; a gas tube which connects the alternating distributor to the air inlet duct; a moving valve in the alternating distributor; an accelerator pedal which is connected to the moving valve and the gas valve in the air inlet duct; and a zeolite container connected to the oxygen and nitrogen suppliers. When the gas valve is close to 1/4 open, only oxygen is supplied and when it is at 1/2 open, only nitrogen is supplied. When the gas valve is completely open, oxygen is supplied again. The zeolite container is used to separate the oxygen and nitrogen and delivers each to its respective supplier.

51375

APTIC NO. 74085

Kugeler, K.

HYDROGEN AS AN ENERGY CARRIER IN INDUSTRY AND HOUSEHOLDS. (*Wasserstoff als Energietraeger in Industrie und Haushalt*). Text in German. *VDI (Ver. Deut. Ingr.) Ber.*, no. 224:47-57, 1974.

The production, distribution, storage, and uses of hydrogen as an energy carrier for industry and households are described. Hydrogen is an environmentally advantageous fuel especially for households because it generates no air pollutants, not even nitrogen oxides if combusted at moderate temperatures or catalytically. Its combustion requires special burners or porous catalysts containing platinum or other precious metals. It can also be used as an energy carrier in power plant boilers gas turbine cycles. Apart from combustion, hydrogen can be used for coal gasification, coal hydrogenation, hydrocracking of mineral oils, for the direct reduction of iron ore, and for ammonia and methanol synthesis. The production of hydrogen by coal gasification with oxygen, steam reforming of natural gas, and gasification of heavy oil with oxygen will be especially advantageous in replacing part of the fossil fuel by nuclear heat from high-temperature reactors. In the long run, nuclear energy will be used for water electrolysis. Hydrogen can be distributed and stored rather simply and economically without undue hazards. A hydrogen pipeline of 300 km connecting major industrial plants in West Germany has been built.

51376

APTIC NO. 73921

Kuhlmann, P.

STIRLING ENGINE FOR AUTOMOBILES. (Der Stirling-motor als Fahrzeugantrieb). Text in German. VDI (Ver. Deut. Ingr.) Ber., no. 224:87-91, 1974. 4 refs.

Technical and environmental aspects of Stirling engines as a power plant for vehicles are described. Clean exhaust gas is the major advantage of Stirling engines. Both the carbon monoxide and hydrocarbon emissions are extremely low, but the oxides of nitrogen emissions are rather high, due to the high combustion temperature. The nitrogen oxides and hydrocarbon emissions combined were not lower than 5 g/PSh, and exhaust gas recirculation may reduce this value to 0.4 g/PSh. The ability to use any kind of gaseous or liquid fuel is another advantage of Stirling engines.

51377

APTIC NO. 71982

Lucas, G. G.

THE AUTOMOTIVE INDUSTRY. Loughborough Univ. of Technology (England), Leverhulme Project, Tech. Aspects of Air Pollut., Proc. Symp., Loughborough, England, 1974, p. 1-12. (Jan. 7-8.)

The control of automobile emissions of carbon monoxide, hydrocarbons, nitrogen oxides, particulates, and lead primarily by methods other than retrofitting is examined within the context of recent legislation concerning exhaust emissions. Various engine modifications involving engine size, compress ratio, stroke/bore ratio, valve timing, and combustion chamber design are reviewed along with operating modifications dealing with engine speed, air/fuel ratio, and spark timing. Research into weak-mixture running and flame speed control is also reviewed. The rotary piston and stratified charge engines are examined as alternatives to the conventional piston engine. The advantages of such concepts in terms of maintaining thermal efficiency and lowering pollution are assessed in relation to the deleterious effects of hang-on devices on engine operation and fuel economy. European legislation on motor vehicle emissions is compared to American legislation, with particular emphasis on future legislation in the state of California.

51378

APTIC NO. 67998

McLean, Arthur F.

LOW EMISSIONS CATALYTIC COMBUSTION SYSTEM.

(Ford Motor Co., Dearborn, Mich.) U. S. Pat. 3,797,231. 7p., March 19, 1974. 6 refs. (Appl. July 31, 1972, 9 claims).

A low emissions catalytic combustion gas turbine engine is described which reduces nitrogen oxide emissions to levels below 2 ppm and achieves a more even temperature gradient across the hot gases generated by catalysis for driving a turbine wheel. The invention provides for adding primary heat to a continuous combustion process using a catalytic combustion mechanism effective in promoting sustained combustion with lean or exceptionally lean air/fuel mixtures. A supply of compressed air is divided so that a portion can be mixed with fuel to support a local flame on the surface of a heat exchanger through which all portions of the flow pass to be combusted. The flame brings the temperature of the flow up to a predetermined operating range for supporting catalytic combustion, at which time the local flame is extinguished. (Author abstract modified)

51379

APTIC NO. 75145

Melcher, J. R. and K. S. Sachar

CHARGED DROPLET SCRUBBING OF SUBMICRON PARTICULATE (FINAL REPORT). Massachusetts Inst. of Tech., Cambridge, Mass., Dept. of Electrical Engineering, Environmental Protection Agency Contract 68-02-0250, Program Element 1AB012, ROAP 21ADL-003, Rept. EPA-650/2-74-075, 258p., Aug. 1974. 78 refs.

NTIS: PB 241262/AS

Charged droplet scrubbing of submicron particles was theoretically and experimentally investigated for three charging configurations, viz., oppositely charged supermicron drops, bicharged drops, and drops charged with the same polarity as the particles being collected. All three of the configurations showed the same collection characteristics, and in each case charging resulted in dramatically improved collection efficiency as compared to inertial scrubbers. During experiments typical of each configuration, inertial scrubbing by 50 micron water drops of 0.6 micron DOP aerosol particles gave 25% collection efficiency as compared to 85-87% efficiency for self-precipitation of particles with charging (droplets not charged) and 92-95% efficiency for drop and particle charging. Charged drop scrubbing is comparable to wet scrubbing in terms of capital and operating costs and similar to electrostatic precipitation in collection efficiency. (Author abstract modified)

51380

APTIC NO. 73932

Obana, Teruji

THE EFFICIENT USE OF WASTE HEAT ON THE DEODORIZING SYSTEM. (Nensho dasshu sochi ni okeru hainetsu riyō). Text in Japanese. Netsu Kanri to Kōgai (Heat Management Public Nuisance), 26(11):22-29, Nov. 1974.

A combustion deodorization apparatus and its associated heat utilization are considered. The effect of combustion temperature on odor strength is analyzed using a flue gas from a paint factory. In order for humans not to smell any scent from the flue gas, a 500-fold flue gas dilution was necessary when the combustion temperature was 750 C; however, a 3000-fold dilution was needed for temperatures of 650 C. Using a hydrogen flame detector, the gas chromatogram peak areas for the flue gases before and after combustion at 75 C were measured, and obtained as 436,000 and 423 sq cm respectively, indicating that a large portion of organic components in the flue gas were eliminated. A typical waste heat utilization is described for a lighting fixtures manufacturing factory, in which odorous gases are produced in a baking and drying furnace, and the waste gases are deodorized by combustion. Two heat exchangers are used in the factory processes. The heat generated from the combustion of waste gases was utilized for heating the waste gases entering the combustion furnace, and for heating the air entering the baking and drying furnace. The total heat generated at both furnaces was 3,670,000 kcal/hr, and the recovered heat at two heat exchangers was 3,170,000 kcal/hr; thus 85% of waste heat was effectively utilized in the processes.

51381

APTIC NO. 69552

Paul, Frank W., Nelson A. Macken, and Minel Negreanu

APPLIED STUDIES IN ADVANCED BOILER TECHNOLOGY FOR AUTOMOTIVE RANKINE CYCLE ENGINES (ANNUAL PROGRESS REPORT).

Carnegie-Mellon Univ., Pittsburgh, Pa., Dept. of Mechanical Engineering, Environmental Protection Agency Grant R0802466, PR/EPA-1, 71p., Jan. 1974. 49 refs.

Alternative heat transfer technology and design concepts for an improved vapor generator design for application in the closed Rankine cycle heat engines are identified. The major heat transfer limitation in a vapor generator is the gas side heat transfer coefficient which in present designs is one or two orders of magnitude smaller than the thermal conduction and working side fluid coefficients. This limits the maximum heat flux which can be transferred to the working fluid. Monotube vapor generators are inherently slow in their transient response characteristics, having equivalent linear time constants of the order of 20 sec and larger. A cylindrical boiler design was analyzed for heat transfer and stress on a preliminary design basis. A limiting constraint is the gas-side combustion surface area required for heat transfer. Mathematical modeling is defining the transient response characteristics. (Author abstract modified)

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APTIC NO. 73922

Pischinger, F.

METHANOL AS A VEHICLE ENGINE FUEL. (Methanol als Brennstoff fuer Fahrzeugmotoren). Text in German. VID (Ver. Deut. Ingr.) Ber., no. 224:59-66, 1974. 17 refs.

The use of methanol as a motor vehicle fuel is described. Methanol can be produced on a large scale from petroleum, coal, and natural gas. It can be stored more conveniently than any gaseous fuel, and does not show any disadvantages relative to gasoline. The vapors of methanol are less harmful than those of gasoline. Methanol is more advantageous economically as a fuel for spark-ignition engines than gasoline because it generates less nitric oxide, unburnt hydrocarbons, and carbon monoxide. Methanol-powered engines emit more aldehydes than gasoline engines. The introduction of methanol as a motor vehicle fuel requires prolonged preparation. Presently, it can be used as an additive to gasoline at a rate of 15-20% to meet the gasoline lead standard.

51383

APTIC NO. 74086

Plassmann, Eberhard, Dieter Hassel, and Wilhelm Bruns

STUDIES ON THE MODE OF ACTION OF CARBURETOR AUXILIARY DEVICES IN VIEW OF IMPROVEMENT OF THE QUALITY OF SPARK-IGNITION ENGINE EXHAUST IN USED AUTOMOBILES.

(Untersuchungen ueber die Wirkungsweise von Vergaser-Zusatzgeraeten im Hinblick auf eine Verbesserung der Abgasqualitaet von Ottomotoren in Altfahrzeugen). Text in German. TUE (Tech. Ueberwach.), 15(10):357-363, Oct. 1974. 9 refs.

The effect of carburetor auxiliary devices causing an increase in the air-excess coefficient and a delay in ignition on the exhaust gas quality of used car engines was studied relative to a test carburetor. The latter was specially calibrated to operate in the lean range of the tolerance zone of the original carburetor. While the carburetor auxiliary devices caused a substantial reduction in the carbon monoxide and unburnt hydrocarbon emissions in connection with a slight increase in the nitrogen oxides emissions as compared with the test carburetor, these devices deteriorated the operating stability and drivability considerably. Almost all carburetor auxiliary devices deteriorated the start-up behavior as compared to the test carburetor.

51384

APTIC NO. 74252

Ploeg, J. E. G., E. Akagi, and K. Kishi

HOW SHELL S FLUE GAS DESULFURIZATION UNIT HAS WORKED IN JAPAN. Pet. Int., 14(7):50-51, 54-55, 58, July 1974. 5 refs.

A description of the first commercial Shell Flue Gas Desulfurization unit installed at Showa Yokkaichi's refinery in Yokkaichi, Japan is presented. The SFGD process is a dry process using a copper on alumina acceptor in swing operation for acceptance and regeneration at about 400 C. The acceptor material is not moved, and plugging of the acceptor beds is prevented by a special reactor design. During regeneration with a hydrogen-containing gas, a sulfur dioxide-rich gas is produced from which elemental sulfur is recovered in a Claus unit by reaction with hydrogen sulfide. The SO₂ produced for the Claus unit is further concentrated in an absorber/stripper system using water. The unit is designed to treat 125,000 standard cu m/hr of flue gas containing 2500 ppm of SO₂, and the present load is about 115 standard cu m/hr of flue gas containing 1250 ppm SO₂. Sulfur dioxide removal efficiency is about 90% thus far. (Author summary modified)

51385

APTIC NO. 73936

Pristupa, A. M.

TREATMENT OF INDUSTRIAL EFFLUENTS AND GASEOUS DISCHARGES IN US INDUSTRIES.

(Ochistka stodnykh vod i gazovykh vybrosov na predpriyatiyakh SShA). Text in Russian. Bumazhn. Promy. (Moscow), no. 12:23-26, Dec. 1974.

A survey of pulp and paper mills in the USA concerning water protection and air pollution prevention is presented. In the absence of Federal standards on air pollutant emissions, dust and malodorous gaseous emissions in plants situated in or near communities are limited by local regulations. Soda reclamation plants are equipped with two or three electrostatic precipitators and additional scrubbers. Venturi scrubbers are used for lime recovery kilns. The use of oxygen and ozone in technological processes in place of other chemicals constitutes a major contribution to air and water pollution abatement.

51386

APTIC NO. 74270

Ranke, Gerhard

ADVANTAGES OF THE RECTISOL-WASH PROCESS IN SELECTIVE H₂S REMOVAL FROM GAS MIXTURES.

Chemical Eng. World, 9(8):77-84, Aug. 1974.

The Rectisol process for the physical absorption of acid gases from various process streams is described along with several of its applications. The process may be of the single or multiple stage type and normally uses methanol as the washing solvent. A three-stage process for the removal of sulfur compounds, gum-forming unsaturated hydrocarbons, and carbon dioxide from gas produced by coal gasification is illustrated. Highly soluble gum-formers together with hydrogen cyanide, heavy hydrocarbons, and water are removed by a small amount of methanol in the first absorption stage. Methanol is separated from the water in a steam-heated distillation column. The bulk of the CO₂ and part of the H₂S are then washed out in the second stage with a large quantity of methanol which is let down in stages to flash off part of the CO₂ and H₂S corresponding to the temperature and pressure. A third absorption stage using sulfur-free methanol is necessary for the complete removal of H₂S and for simultaneously removing the CO₂ content to the required level. Pure methanol is recovered by heating the loaded methanol to its boiling point and stripping with reboiled vapor.

51387

APTIC NO. 71798

Rapp, Tamas

THE AIR POLLUTION-ABATING EFFECT OF MODERN DOMESTIC HEATING EQUIPMENT. (A korszeru lakossagi tuzeles levegoszennyezest merseklo hatasa). Text in Hungarian. Energiagazdalkodas, 15(10):450-452, Oct. 1974. 12 refs.

Problems of air pollution generated by domestic and institutional heating equipment and possibilities of its abatement are described. Dust, soot, fly ash, sulfur dioxide, carbon monoxide, and nitrogen oxides are the major air pollutants generated by heating equipment. These emissions can be substantially abated by a change to natural gas or low-sulfur or sulfur-free fuels, electricity, central heating, and remote heating. Appropriate design of heating equipment; adequate use, adjustment, maintenance, and inspection of firing equipment; and the abandonment of obsolete equipment are essential for emission abatement. The soot emission from central heating boilers reduced from 300 to 50 mg/kg or less after adjustment, and increases of 1 to 10% were achieved in the efficiency.

51388

APTIC NO. 71565

Reed, T. B., R. M. Lerner, E. D. Hinkley, and R. E. Fahey

IMPROVED PERFORMANCE OF INTERNAL COMBUSTION ENGINES USING 5-30% METHANOL IN GASOLINE. Preprint, Lincoln Lab., Lexington, Mass. and Massachusetts Inst. of Tech., Cambridge, The Energy Lab., 4p., 1974. 12 refs.

Vehicle performance, fuel economy, and exhaust emissions were measured during road tests of various unmodified automobiles (model years 1968-1974) using mixtures of methanol and gasoline. Carbon monoxide emissions were reduced from between 20-70% with mixtures containing from 5-15% methanol. Fuel economy and performance were increased. The improved performance with methanol addition was attributed

to chemical leaning plus the dissociation of methanol near 200 C, leading to the absorption of energy during the compression stroke of the engine and the release of up to 40% hydrogen for a 10% mixture.

51389

APTIC NO. 69428

Reynolds, R. W., J. S. Smith, and I. Steinmetz

METHYL ETHERS AS MOTOR FUEL COMPONENTS. Preprint, American Chemical Society, Washington, D. C., Div. of Petroleum Chemistry, 21p., 1974. (Presented at the American Chemical Society, National Meeting, 168th, Atlantic City, N. J., 1974, Paper 11.)

Oxygenated hydrocarbons are being considered for use as high octane motor fuels because the gasoline supply potentially could be increased by conversion of fossil fuels to oxygenated hydrocarbons. The use of high octane oxygenated hydrocarbons could permit an increase in the antiknock quality of unleaded gasoline which would allow the use of higher compression ratios, thus improving fuel economy and lowering emission levels. Many oxygenated hydrocarbons, both alcohols and ethers were tested for motor fuels. Methyl tertiary butyl ether (MTBE) was selected for further evaluation. Experiments applying MTBE in unleaded gasoline and the etherification process are discussed. The MTBE was evaluated in engine, chassis dynamometer, exhaust emission, safety, and toxicological acceptability studies. An unleaded gasoline containing 15 vol% MTBE was tested for more than 1 yr in employee-driven cars which accumulated an excess of 120,000 mi. The MTBE was a suitable component in unleaded gasolines in concentrations up to 15 vol%. Use of MTBE in motor fuels overcame many of the problems associated with methanol and other low molecular weight alcohols. The MTBE can be made easily by reaction of isobutene and methanol. The chargestocks can be obtained from conventional refinery streams or produced from coal synthesis gas. (Author summary modified)

51390

APTIC NO. 73935

Roth, J.

POSSIBILITIES FOR LIMITING LEAD EMISSIONS FROM AUTOMOBILES. (Les possibilités de limitation des émissions de plomb par les véhicules automobiles). Text in French. Rev. Inst. Franc. Petrole, 29(2):267-282, March-April, 1974. 6 refs.

A trapping device for reducing automobile exhaust lead emissions is described. An endurance test of 31,000 km demonstrates a 60% collection efficiency for the device; carbon monoxide and hydrocarbon emissions are unaffected.

51391

APTIC NO. 75142

Sahagian, J., R. Dennis, and N. Surprenant

PARTICULATE EMISSION CONTROL SYSTEMS FOR OIL-FIRED BOILERS (FINAL REPORT). GCA Corp., Bedford, Mass., Technology Div., Office of Air and Waste Management Contract 68-02-1316, Rept. EPA-450/3-74-063, 81p., Dec. 1974. 34 refs.

NTIS: PB 241277/AS

The effectiveness of particulate emission control systems on oil-fired boilers was assessed by reviewing National Emissions Data System files and stack test data from various sampling programs. Emission rates for boilers (100 MW capacity or greater) controlled by electrostatic precipitators average about 3.8 lbs/1000 gal; the effective efficiency for such units is roughly 50% or less for boilers that are well controlled from the combustion standpoint. Inertial collectors of the multicyclone type are generally of little value for controlling oil-fired boiler particulate emissions except for the capture of gross particulates (greater than 10 micron in diameter) in the acid smut category. Wet scrubbing systems developed mainly for sulfur oxide removal provide high particulate collection; however, the power requirements to achieve greater than 90% particulate removal and the plume reheating necessary to provide for vapor plume rise and dissipation may exceed those

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for electrostatic precipitation. Normal variations in fuel oil sulfur and ash content exert no significant effect on particulate emission rates, although the use of fuel additives to regulate ash slugging and cold-end corrosion do produce higher particulate rates. (Author conclusions modified)

51392

APTIC NO. 73830

Saki, Masakazu and Toru Sasaki

ELECTROSTATIC PRECIPITATOR ON THE TOP OF WC.KSHOPS. (Kenokujobu tosaigata denki shujin sochi). Text in Japanese. Sumitomo Jukikai Giho (Sumitomo Heavy Mach. Tech. Rev.), 22(64):113-118, Aug. 1974.

An electrostatic precipitator to be mounted on top of a workshop was developed for dust collection. The hopper was designed to have a structure which could permit smooth air flow in the precipitator. Light-weight materials such as polyvinyl chloride, fiber reinforced plastic, or a similar synthetic resin were used as the dust collecting electrode. Dust removal from the collecting electrode was by scrubbing in order to minimize the mechanical vibration. Test results of a 7 KWH electrostatic precipitator with PVC electrode, which consumed 0.6 cu cm/hr water and treated dust-containing gas at 2000 cu m/min, showed that dust concentration was reduced from 0.03-0.3 g/N cu m to 0.007-0.03 g/N cu m, giving 80-98% collection efficiency. The electrostatic precipitator had the advantages of low installation and operation costs, easy maintenance, and high efficiency.

51393

APTIC NO. 75289

Sanayev, Y. I. and I. K. Reshidov

STUDY OF DUST RE-ENTRAINMENT PHENOMENA AND THEIR INFLUENCE OF EFFICIENCY OF INDUSTRIAL ELECTROSTATIC PRECIPITATORS.

(Issledovaniye yavleniya vtorichnogo unosa pyli i yego vliyaniya na effektivnost promyshlennyykh elektrofil trov). In: Development of Methodology and Establishment of Efficiency of Industrial Dust Collection Equipment for Fine Particulate. U. S./USSR Working Group on Stationary Source Air Pollution Control Technology, U. S./USSR Environmental Agreement, Proj. A-4, Task 1, p. 1-10, Sept. 1974. 2 refs. Translated from Russian, 10p. (Also: Prom. sanit. Ochistka gazov, no. 1:1-5, 1974.) (Entire report of TR 104-75 processed under APTIC 70040.)

Laboratory and field tests were conducted to investigate the effect of dust re-entrainment on the particle collection efficiency of electrostatic precipitators. The studies indicated the following: the collection efficiency with C-shaped precipitating electrodes can be increased with further improvement in their shape; the optimum vibration schedules of the precipitating electrodes can be determined by suitable calculations; and periodic vibration of precipitating electrodes, even in the case of high-resistivity dusts, results in extended service life and increased efficiency. Laboratory tests established that the vibration schedule depends on the specific dust precipitation (the mass located with in 1 sq m of the precipitating electrode at the moment preceding vibration). The gas velocity also affects the amount of re-entrainment and collection efficiency.

51394

APTIC NO. 72234

Sarto, Jorma O.

EXHAUST RECIRCULATION. (Chrysler Corp., Highland Park, Mich.) U. S. Pat. 3,827,414. 6p., Aug. 6, 1974. 3 refs. (Appl. Sept. 21, 1972, 17 claims).

An exhaust gas recirculation system for the reduction of nitrogen oxides from internal combustion engine exhaust is described that employs a minimum number of moving parts, thus overcoming prior art deficiencies relating to cost and operation. The engine exhaust gases are recycled through a duct that has a restricted upstream end opening into the exhaust system and first and second restricted downstream ends opening into the carburetor inlet induction conduit downstream

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and upstream respectively of the throttle valve. The restrictions for the recycling duct are dimensioned with respect to each other such that when the throttle valve is at its closed or idle position a major quantity of the air required to support engine combustion at idle is bypassed around the throttle valve and flows from the second to first downstream end of the recycling duct. The second restricted downstream end opens into the induction conduit at the usual fuel metering venturi restriction and is restricted appreciably less than the first downstream end. Thus, when the throttle valve is opened from the idle position, the first downstream end exerts only a minor influence on the pressure in the recycling duct, and the exhaust gas flow into the recycling duct via the restricted upstream end is substantially a function of the pressure differential between the exhaust pressure at the upstream end and the venturi pressure at the second downstream end. The induction conduit pressure immediately upstream of the upstream leading edge of the throttle valve blade is used to operate a valve to close the recycling duct completely during both idle and wide-open throttle operation. (Author abstract modified)

51395

APTIC NO. 74087

Schaffrath, M.

HYDROGEN AS A MOTOR FUEL. (Wasserstoff als Treibstoff fuer Verbrennungsmotoren). Text in German. VDI (Ver. Deut. Ing.) Ber., no. 224:79-85, 1974. 2 refs.

Engineering problems and environmental advantages of the use of hydrogen as a motor fuel are discussed. Compared with gasoline, gaseous hydrogen forms homogeneous mixtures with air due to its high diffusion capability, and its mixtures with air are combustible in a range of 4-75% by volume hydrogen. Backfiring can be avoided by adequate cooling, by increasing the air-excess coefficient, and by consecutive admission of air and hydrogen. The oxides of nitrogen emissions increase with decreasing air-excess coefficients toward the stoichiometric value. Hydrogen as a motor fuel can be stored in high-pressure tanks, cryogenic tanks, and bound in the form of metal hydrides, especially magnesium hydride. Explosion hazards due to evaporation losses from cryogenic losses can be prevented by catalytic burning of the escaping gas. Vehicle operated with hydrogen bound in metal magnesium hydride can be started by an iron-titanium hydride battery supplying hydrogen at low temperature.

51396

APTIC NO. 72327

Schmidt, Frei

COMPARISON OF TURBULENT BED DUST COLLECTORS WITH FAMILIAR CATALYTIC METHODS. (Vergleichende Betrachtungen der Wirbelschichtstaubabscheidung mit bekannten kontaktverfahren). Text in German. Preprint, Technische Hochschule fuer Chemie Carl Schorlemmer, Leuna-Merseburg (German Democratic Republic). Umweltschutztechnik, 10p., 1974. 9 refs. (Presented at the Process Engineering, Annual Conference, Dresden, German Democratic Republic, 1974.)

The fluidized-bed dust separation process patented by Jugel et al. in 1967 is described and compared with other contact separation methods. According to this process, solid particles in the gas stream are separated on wetted particles of a particulate bed that is fluidized by the upstream of the waste gas to be purified. This apparatus is closely related in its principle to packed filters, foam scrubbers, and especially to floating bed scrubbers all adopting the contact principle.

51397

APTIC NO. 74157

Schulten, R. and H. Barnert

CLOSED-CYCLE ENERGY SUPPLY. (Energieversorgung in geschlossenem Kreislauf). Text in German. VDI (Ver. Deut. Ing.) Ber., no. 224:25-35, 1974.

A closed-cycle thermal energy supply by means of nuclear reactors (EVA/ADAM system) is described. The thermal ener-

gy of the nuclear reactor cooling medium, helium, is converted into latent thermal energy in chemically bound form in the EVA reactor in which methane is converted into carbon monoxide and hydrogen by the steam reforming process. The CO and H₂ generated in this reactor are carried through a pipeline to the ADAM chemical reactor where heat is generated by the reversible chemical reaction of the energy carriers for hot water or steam generation which are available for immediate final use. The methane formed in this chemical reactor is returned to the first reactor for repeated cycling.

51398

APTIC NO. 71585

Schwab, Louis

IMPROVED ELECTROSTATIC GAS FILTER. (Assignee not given.) Brit. Pat. 1,361,166. 5p., July 24, 1974. (Appl. Feb. 22, 1973, 20 claims).

An electrostatic particulate filter is described that utilizes three electrodes to overcome problems of the rate of agglomeration and separation of particles associated with previous two-electrode designs. The three electrodes of the device are positioned in a parallel and space relationship to one another along the direction of gas flow. The first and third electrodes receive one type of varying voltage, while the middle electrode receives a different varying voltage. The first varying voltage lies between 10,000 and 99,999 volts and cyclically varies in frequency from 1000 to 9999 Hertz. The second varying voltage (middle electrode) lies between 100 and 999 volts at a frequency range between 100,000-999,999 Hertz.

51399

APTIC NO. 73777

Shigemitsu, Hideyoku

ON SODIUM SULFITE-GYPSUM METHOD OF TOHOKU DENRYOKU (KAWASAKI-KUREHA). (Tohoku Denryoku ariyusanso-sekko ho (Kawasaki-Kureha) ni tsuite). Text in Japanese. Sekiyu To Sekiyu Kagaku (Petrol. Petrochem.), 18(12):62-65, Dec. 1974.

A description is given of exhaust gas desulfurization by the Kawasaki-Kureha sodium sulfite-gypsum method, put into operation at the Shin Sendai Thermal Power Plant, Japan, by Tohoku Denryoku KK in March 1974. This process, also known as the double alkali method, is composed of three procedures: (1) absorption of sulfur dioxide gas in sodium sulfite solution to form sodium bisulfite and passage of the remainder of the exhaust into the atmosphere; (2) regeneration off liquid absorbent (secondary decomposition of sodium bisulfite by calcium carbonate into sodium sulfite, calcium sulfite, water and carbon dioxide) and of sodium sulfate, formed by oxidation of sodium sulfite in other processes, back to sodium bisulfite, by reaction with calcium sulfite and sulfuric acid; and (3) oxidation of calcium sulfite to calcium sulfate (gypsum). Calcium sulfate obtained as a reaction product in procedure (2) is combined with gypsum formed in procedure (3). During 6 months of operation, desulfurization was effected on an exhaust gas load of 420,000 N cu m/hr, where sulfur dioxide gas content varied from 400-800 ppm. At the absorption tower outflow before the afterburner, SO₂ concentrations ranged from 2-10 ppm, and never more than 15 ppm during short-term peaks. As by-product, 88 tons/day of gypsum (CaSO₄·2H₂O) were obtained. Operational problems have been encountered in all parts of the process. These include: sodium sulfate formation; scaling-up problems from test plant operations; difficulties in automatic ignition of the afterburner, meandering of the filter cloth belt in the secondary decomposition equipment; plugging of oxidation tower; problems in centrifugal separation of water and gypsum.

51400

APTIC NO. 68160

Spencer, John D. and Bill Linville

BUREAU OF MINES ENERGY PROGRAM, 1973. Bureau of Mines Information Circ., no. 8651:1-8, 1974. 169 refs.

The Bureau of Mines energy research program during 1973 is reviewed and particular emphasis is placed on the develop-

ment of new and improved methods for the discovery and production of oil and gas and the production of fluid fuels from coal. Research highlights related to problems of air pollution include: petroleum composition studies to promote more efficient refining of low-lead gasoline and less vehicle exhaust pollutants; the use of coal-derived synthetic gas for motor vehicle fuel; the production of pipeline quality gas and low-Btu gas from coal gasification pilot plant processes; the production of pipeline gas from organic wastes (cattle manure); underground gasification of coal; flue-gas scrubbing systems for sulfur dioxide removal; the reduction of nitrogen oxides during coal and char combustion; respirable coal dust analyses in mines; the removal of fly ash from stack gases; air quality monitoring; catalytic and chemical desulfurization of coal; and the production of fuel oil from coal and solid wastes. Other topics covered include: magnetohydrodynamic generation of electrical power from coal, mines spoils reclamation with coal wastes, oil recovery from shale, and stimulative oil and natural gas production methods.

51401

APTIC NO. 74027

Sundtrom, Warren

HYDRODESULFURIZATION OF PETROLEUM FRACTIONS. *Ind. Petrole.*, 42(7-8):41-44, July/Aug. 1974.

Hydrodesulfurization processes for reducing the sulfur content of petroleum fractions and thus the sulfur dioxide emissions resulting from their combustion are reviewed. Low-sulfur residual fuel oil may be produced from high-sulfur fuel oil by the direct hydrodesulfurization of atmospheric-reduced crude or indirectly via vacuum distillation. The indirect process, which possesses fewer technical problems but is less efficient, involves separating atmospheric-reduced crude into heavy vacuum gas oil and residuum in a vacuum distillation unit. The heavy vacuum gas oil is desulfurized and then rebled with the vacuum residuum. The method's maximum overall desulfurization efficiency is about 40-50%. Sulfur reductions of from 75-80% can be achieved with the direct hydrodesulfurization method which is essentially the same procedure as the indirect method, notwithstanding more severe reactor operating conditions. Catalyst life is shorter and catalyst regeneration and replacement are more frequent, however, for the direct process. The increased use of direct desulfurization appears to depend on future sulfur restrictions and related economic incentives.

51402

APTIC NO. 74245

Tice, A. E.

TEST SHOW WORTH OF ALLOYS IN SCRUBBER ENVIRONMENT. *Elec. Light Power*, 52(21):EG7-EG9, Dec. 1974.

Various alloys with potential application in flue gas scrubbing systems were subjected to corrosion testing in lime/limestone processes and a Wellman-Lord desulfurization process. Alloys showing no measurable corrosion in various locations of a limestone slurry venturi absorber were Hastelloy C-276, Inconel alloy 625, Hastelloy alloy G, and titanium. The cast stainless alloy CD4MCu also showed excellent corrosion resistance. Tests in a flooded disc limestone slurry scrubber illustrated complete resistance to both general attack and pitting for CD4MCu, Armco 22-13-5, Incoloy alloy 825, Inconel alloy 625, Hastelloy alloys C and G, and titanium. Tests involving the exposure of various alloys to different points in a Wellman-Lord desulfurization installation indicated that the Carpenter 20Cb3 and Incoloy alloy 825 possessed low corrosion rates but were susceptible to pitting. Hastelloy C-276 and Inconel alloy 625 were free of surface pitting attack, though the latter showed very slight crevice corrosion in high corrosion zones.

51403

APTIC NO. 74192

Tokue Toku, Fukuo Yaginuma, Kiyogi Kawanishi, and Toichiro Hikichi

REDUCTION OF CARBON PARTICLES IN DIESEL ENGINE EXHAUST GASES. (*Dizeru kikan no haiki kokuen teigen no kenkyu*). Text in Japanese. *Nihon Daigaku Kogakubu Kiyo* (J. Coll. Eng., Nihon Univ.), no. 15-A: p. 87-95, March 1974. 11 refs.

The use of cyclone to remove soot particles from the exhaust gas of a one-cylinder, four-cycle, high speed diesel engine was investigated. A surge tank 30 cm in diameter and 35 cm long was placed between the engine and the cyclone to prevent the effect of pulsation by exhaust gas flow. The cyclone was effective for removing such particles from the exhaust gas, particularly when the particle's Bosch number was higher than five. A cyclone with an outside diameter to inside diameter ratio of 0.5 and a long conical section was not as successful as expected because the pulsation of gas flow interfered with the turning action of the cyclone. However, the collection efficiency was high for steady gas flow. The collection efficiency was greatly reduced when the conical part was longer than three times the inside diameter and the gas inlet velocity was lower than 10 m/sec. The overall collection efficiency was about 60%; however, with a suitable surge tank and coagulator, it was increased to 80%.

51404

APTIC NO. 72184

Townsend, Ray T.

ROTARY INTERNAL COMBUSTION ENGINE AND METHOD OF COOLING THE SAME. (Townsend Engineering Co., Des Moines, Iowa) U. S. Pat. 3,828,740. 12p., Aug. 13, 1974. 1 ref. (Appl. April 16, 1973, 9 claims).

A rotary internal combustion engine in which the exhaust is passed out of the individual cylinders instead of through a common valve port is described that avoids excessive pressure and temperature from occurring in the cylinders during combustion. The cam plate of the engine consists of a pair of lobes positioned 180 deg apart. A slightly curved cam surface is provided on each of the lobes adjacent the position of maximum compression so that the pistons may partially move to an expanded position immediately after the point of maximum compression. Substantially complete combustion is thus achieved without causing excessive pressure and temperature in the cylinder. Ambient air is introduced directly into the cylinders for a time period greater than that consumed by the power portion of the expansion stroke of pistons after combustion to purge the exhaust gases and to cool the pistons and cylinder interiors.

51405

APTIC NO. 71737

Turner, Leslie C. and Harry Cockreham

ENERGY GENERATION SYSTEM ADAPTABLE FOR BURNING DUST-TYPE FUELS. (Tureco Engineering, Inc., Lake Oswego, Oreg.) U. S. Pat. 3,824,937. 10p., July 23, 1974. 7 refs. (Appl. May 4, 1973, 21 claims).

A combustion-type energy generation system, especially applicable to firetube boilers, that is capable of utilizing sawdust waste as its primary fuel (up to 90% of the total fuel composition) is described that overcomes prior-art limitations of excessive temperatures within the combustion chamber and incomplete fuel combustion. The system comprises a demand-responsive metering apparatus that controls the fuel/air ratio and mass flow rate of the dust fuel with a degree of accuracy comparable to that obtainable with gas and oil fuels. Dust fuel, normally of variable density, is fed from a large storage hopper into a metering bin sized to hold only a small volume of the fuel. A rotary agitator within the bin equalizes the density of the dust fuel and divides it into equal volumetric portions which are passed in succession over an opening in the bottom of the bin. The size of the opening is variably modulated by a reciprocating metering gate whose position is determined by a controller responsive to system energy demands.

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Small predetermined quantities of the fuel, dependent on the size of the opening, drop through the opening periodically and are transformed into a continuous homogeneous stream of dust fuel by a screw conveyor located below the opening. The conveyor feeds the stream of dust into a blower which transports the dust suspended in an air stream to a dust fuel burner. (Author abstract modified)

51406

APTIC NO. 75386

Vogel, G. J., M. Haas, W. Swift, J. Riha, C. B. Schoffstoll, J. Hepperly, and A. A. Jonke

REDUCTION OF ATMOSPHERIC POLLUTION BY THE APPLICATION OF FLUIDIZED-BED COMBUSTION (ANNUAL REPORT). Argonne National Lab., Ill., Environmental Protection Agency Interagency Agreement EPA-IAG-0199(D), Program Element 1AB013, ROAP 21ADB-011, ANL/ES-CEN-1006, Rept. EPA-650/2-74-057, 132p., June 1974. 6 refs.

NTIS: PB 237366/AS

A fluidized-bed combustion pilot plant and a fluidized-bed regenerator, both capable of operating at 10 atmospheres pressure, were tested in coal combustion experiments. Over 90% sulfur retention in a fluidized bed of dolomite was obtained with the continuous addition of fresh dolomite at a calcium to sulfur ratio of 3 and at 9 atmospheres pressure and a temperature of 843 C. The nitric oxide level in the flue gas was less than 150 ppm. Two regeneration methods were tested: a one-step reductive decomposition of calcium sulfate to calcium oxide (lime) and a two-step process consisting of the reduction of CaSO₄ to calcium sulfide, followed by the reaction of CaS with water/carbon dioxide. Complete release of sulfur from the particles was not achieved by either regeneration method, and decrepitation of the particles occurred. (Author abstract modified)

51407

APTIC NO. 75387

Vogel, G. J., W. M. Swift, J. F. Lenc, P. T. Cunningham, W. I. Wilson, A. F. Panek, F. G. Teats, and A. A. Jonke

REDUCTION OF ATMOSPHERIC POLLUTION BY THE APPLICATION OF FLUIDIZED-BED COMBUSTION AND REGENERATION OF SULFUR-CONTAINING ADDITIVES (ANNUAL REPORT). Argonne National Lab., Ill., Environmental Protection Agency Interagency Agreement EPA-IAG-149(D) and Office of Coal Research Interagency Agreement OCR-IAG-14-32-0001-1543, Program Element 1AB013, ROAP 21ADB-011, ANL/ES-CEN-1007, Rept. EPA-650/2-74-104, 136p., Sept. 1974. 26 refs.

A bench-scale, fluidized-bed combustion pilot plant capable of operating at 10 atmospheres pressure was used to evaluate the effects of operating variables on flue gas sulfur dioxide and nitrogen oxide levels, combustion efficiency, additive utilization, and heat transfer. High retentions of sulfur (greater than 90%) and low NO levels (less than 150 ppm) were achieved with a fluidized bed of dolomite where SO₂ reacted with lime in the dolomite to form calcium sulfate. The combustor was successfully tested using a variety of coals: highly caking, high-volatile bituminous, high ash subbituminous, and low-heating value lignite. The kinetics of the reaction of half-calcined dolomite with SO₂ were first order with respect to SO₂ concentration in the presence of water vapor and approximately three-fourths order in the absence of water vapor. Material balances were obtained for mercury, lead, beryllium, and fluoride; data were also obtained for sodium concentration in the particulate matter entrained in the flue gas from the combustor. (Author abstract modified)

51408

APTIC NO. 72328

Vollheim, G. and J. Troeger

EXAMPLES OF WATER AND AIR PURIFICATION BY CATALYTIC REACTIONS. (Beispiele fuer die Reinigung von Wasser und Luft durch Katalytische Reaktionen). Text in German. Dechema Monograph., 75(1452-1485):183-192, 1974. 7 refs.

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Catalysts can be used in the factory processes of the chemical industry without harm to the environment. The reduction of nitroaromatic substances with the aid of iron and hydrochloric acid, still used nowadays to some extent, is contrasted to the reduction by hydrogen on a platinum-active carbon catalyst which produces no by-products harmful to the environment. A special catalyst for production of halogenated aniline derivatives, which serve as intermediates for a certain class of pesticides, is described. Finally, the burning of waste gases is considered; this requires temperatures of about 800 C without catalysts, while only 350 C is required with catalysts.

51409

APTIC NO. 72296

Went, J. J.

FUTURE S ENERGY. (A jövő energiája). Text in Hungarian. Energia Atomtech. (Budapest), 27(12):537-541, Dec. 1974. (Presented at the 16th UNIPED Conference, The Hague.)

The prospects of conventional energy carriers, and the chances for new sources of energy are described. The combustion of fossil energy carriers causes changes in the atmosphere whose consequences can not yet be predicted with certainty. This, and the foreseeable depletion of fossil energy carriers will cause a need for unconventional energy sources, and especially for nuclear energy to satisfy future energy needs. The development of breeder reactors will make it possible to utilize materials with very low uranium contents, such as sea water, which means that nuclear reactors will be able to satisfy all energy needs. Hydrogen, which generates harmful nitrogen oxides during its combustion only at very high temperatures, is proposed as a transportable energy carrier that can be generated in nuclear power plants, or by the exploitation of the reserve capacity of power plants.

51410

APTIC NO. 73685

Werner, C.

INFLUENCE OF MULTIPLE SCATTERING BY AEROSOLS ON THE REMOTE MEASUREMENT OF ATMOSPHERIC PARAMETERS. (Einfluss der Mehrfachstreuung an Aerosolen auf die Fernmessung atmosphärischer Parameter). Text in German. Landesanstalt fuer Immissions- und Bodennutzungsschutz des Landes Nordrhein-Westfalen, Essen (Germany), Laser-Tag., Stand Anwendungstech. Lasern Geb. Luftreinhaltung, Essen, Germany, 1974, p. 84-93. 7 refs. (Oct.)

Multiple scattering as a factor influencing the lidar telemetry of atmospheric parameters, including pollutant concentration, was studied. Experimental and theoretical investigations demonstrated that multiple scattering cannot be ignored in lidar telemetry, because it causes a flaring up of the laser beam which will exist longer in time and have a reduced intensity. The laser beam penetrates through certain cloud layers with a constant scattering coefficient, and part of the light is scattered both backward and forward in each layer. Experiments with the lidar system IV revealed that multiple scattering leads to reduced reading when scanning flue gas plumes for particulates. The effect of multiple scattering on gas concentrations in flue gas plumes has not yet been studied.

51411

APTIC NO. 72185

Wilder, Harry D. and Homan B. Kinsley, Jr.

FILTER. (Ethyl Corp., Richmond, Va.) U. S. Pat. 3,826,067. 6p., July 30, 1974. 4 refs. (Appl. April 5, 1972, 14 claims.)

A filter element with high structural integrity and temperature resistance that is suitable for filtering particulates from internal combustion engine exhaust streams is described. Glass fibers are bound by a quaternary ammonium silicate binder to form a filter mat. Other finer fibers can optionally be included in the mat structure to reduce the porosity of the final mat such that it retains the particles removed from the exhaust stream. Asbestos or micro-glass fibers may be used to reduce the porosity of the mat.

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Winston, S. J. and T. R. Thomas

APTIC NO. 73878

A POTENTIAL METHOD FOR ABATEMENT OF HCL GENERATED IN THE INCINERATION OF PVC PLASTICS. Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 8p., 1974. 4 refs. (Presented at the Air Pollution Control Association, Pacific Northwest International Section, Annual Meeting, Boise, Idaho, 1974, Paper 74-AP-27.)

A potential method for the abatement of hydrogen chloride emissions generated during the incineration of polyvinyl chloride-containing radioactive wastes at Atomic Energy Commission sites is described. The method involves reacting ammonia with HCl in the gas phase, condensing the solid ammonium chloride which is formed on a cooled surface, and mechanically transferring it out of the gas stream. Fly ash in the off gas serves as seeds for the nucleation of NH₄Cl, thus allowing for the collection of most of the NH₄Cl in the condensation vessel and in turn reduces the load on the downstream cyclone or roughing filter. The method generates no liquid waste that requires further treatment and produces a usable material in the form of NH₄Cl. It also allows for volume and mass reduction of waste material.

51413

Wohleben, G.

APTIC NO. 73904

UNCONVENTIONAL SOURCES FOR INTEGRATED ENERGY SUPPLY IN PETROCHEMICAL PLANTS. (Nichtkonventionelle Energietaeuer fuer integrierte Energieversorgung in der Petrochemie). Text in German. VDI (Ver. Deut. Ingr.) Ber., no. 222:61-67, 1974.

A plant coupling heat and power production is described. It comprises three batteries with a total of five boilers and produces 760 tons of steam/hr at 200 atm and 560 C. At full load operation 100 to 115 MW are generated supplying about 520 tons of steam/hr to the connected networks. For power production, a total of six back-pressure turbines are installed with capacities between 15 and 30 MW. For compensation of the lower power output due to higher waste heat production a 5 bar 10 MW condensation turbine was installed, raising the power output by 28 to 30 MW. Moreover, three incinerators with a combined capacity of 160 tons of steam/hr serve the combustion of toxic liquid and gaseous waste products. Through combining heat and power production roughly 615,000 tons of fuel oil were saved in the period 1961 to 1972. Because of the lower fuel consumption (less than 50% of the normal demand) the SO₂ emissions dropped from 38,744 to 17,856 tons. Other installations for using the waste products resulting from the increasing waste heat steam production include the installation of auxiliary burners, supply of the medium and high pressure steam into the plant network instead of to the back-pressure turbine with low capacity, and the use of waste heat steam for preheating high pressure feed water.

51414

APTIC NO. 74267

Wright, Charles H., Russell E. Perrussel, and Gerald R. Pastor
DEVELOPMENT OF A PROCESS FOR PRODUCING AN ASHLESS, LOW-SULFUR FUEL FROM COAL. VOLUME II - LABORATORY STUDIES. PART I - AUTOCLAVE EXPERIMENTS (INTERIM REPORT). Pittsburgh and Midway Coal Mining Co., Kansas City, Mo., Office of Coal Research Contract 14-01-0001-496, OCR R and D Rept. 53, Interim Rept. 6, 333p., 1974 (?). 36 refs.

Autoclave experiments and related laboratory studies designed to develop a solvent refining process for the production of an ashless, low-sulfur fuel from coal were performed. The reaction studies were conducted in a 1-liter autoclave using a variety of coal types and solvents. Bituminous coals swelled and produced viscous solutions as they interacted with anthracene oil and hydrogen during the initial heating of the mixture. The viscous product then decomposed to make a comparatively low viscosity product as the heating was con-

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tinued. An endothermic reaction occurred during formation of the viscous solution. Neither subbituminous coal nor lignite swelled or formed viscous solutions comparable to those formed with bituminous coals during the initial interaction with solvent. Neither coal produced an apparent endothermic reaction. The substitution of carbon monoxide plus water for hydrogen during a number of autoclave experiments produced useful coal solutions. The utilization of hydrogen resulting from the reaction of carbon monoxide plus water was remarkably efficient. The presence of sodium ion as an alkaline salt or the presence of iron compounds derived from pyrite was beneficial in facilitating the water shift reaction. Bituminous coals produced vacuum bottoms containing more residual sulfur, while the lower rank coals tended to produce vacuum bottoms containing a little more oxygen. However, the solvent derived from any of these coals is basically similar in chemical composition. (Author summary modified)

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APTIC NO. 67965

Yeager, Kurt E.

THE IMPACT OF ENERGY SELF-SUFFICIENCY ON POLLUTION CONTROL. Environmental Protection Agency, Cincinnati, Ohio, National Environmental Research Center and Battelle Memorial Inst., Columbus, Ohio, Columbus Labs., Pollut. Control Technol. Assess., Proc. Environ. Resour. Conf., Columbus, Ohio, 1974, p. 130-147. (May 1-3, Paper EPA-670/9-74-006.)

The impact of energy self-sufficiency on pollution control is considered in terms of major environmental problems in the achievement of such self-sufficiency and the corresponding federal environmental research objectives designed to solve these problems. The fundamental goals of the federal energy-related research program are: improvement in the understanding of the environmental impact of energy self-sufficiency; determination of the relationships between source control and impact reduction in social, economic, and environmental terms; and the translation of these research efforts in a manner which permits the public and its representatives to make policy decisions based on knowledge of the total costs and benefits of various approaches to energy self-sufficiency. Research efforts are summarized for such activities as the use of high temperature gas turbines with low BTU coal gasification for improved thermal efficiency in electrical generation, the use of solid wastes as fuels, magnetohydrodynamics, fuel cells, coal and oil shale mining, direct combustion, coal liquefaction and gasification, fluidized bed coal combustion, nuclear energy production, solar energy uses, and geothermal systems.

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APTIC NO. 69177

THE PROTECTION OF THE TELEPHONE SWITCHBOARD FROM AIR POLLUTION- CONTROL OF SULFUR DIOXIDE GAS FILTRATION INTO THE MACHINE ROOM. (Taiki osen kara kokanki o mamoru-kikaishitsunai e no arysan gasu shinnyu no boshi). Text in Japanese. Tsuken Geppo (Monthly J. Elec. Common. Lab.), 27(4):15-18, April 1974.

A test air cleaner for machinery rooms was designed for prevention of dioxide filtration and corrosion of telephone switchboards. For removal of SO₂, a laminated filter of seven layers consisting of a main alkaline filter (urethane foam soaked in caustic soda solution), a prefilter of mesh synthetic non-woven cloth, and an after-filter of urethane foam was used. The outside air can infiltrate into a machinery room through the windows, the entrance, the machinery hatch, cable holes, and gaps around an air conditioning window unit. In this case, the air conditioner was installed outside the room in order to force cleaned air into the room and to prevent the entrance of outside air by the pressure difference. The treatment air capacity of the system is 30-100 cu m/min (adjustable). The system has 15 alkaline filters with the capacity of 7.5 cu m/min/sheet, a humidifier, a fan, and a motor. The humidifier

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maintains the relative humidity of 40% for best filter results. An automatic SO₂ meter and colorimetry were used for checking the effects of the air cleaner. The air-tight test showed that one ventilation in two hours achieved the air pressure increase by 10 mm in the room, preventing the entrance of the outside air. The model worked for 6 mo with an accurate SO₂ removal rate of 95%, keeping the room SO₂ level at 10 ppb (outside, 0.03 ppm). But after 6 mo, the elimination rate suddenly dropped to 30%. With the environment of industrial areas with a higher SO₂ level, the filter life is expected to be even shorter.

51417

APTIC NO. 69229

Council for Industrial Systems (Japan) and Sub-Committee for Automobile Pollution Countermeasures (Japan)

NO-LEAD TREATMENT OF AUTOMOBILE GASOLINE. (*Jidosha gasorin no muenka taisaku ni tsuite*). Kankyo Hoken Reporto (Environ. Health Rept.), no. 30:31-42, July 1974.

When a no-lead gasoline is used under given conditions, valve seat recession is caused and a number of problems occur subsequently, including an increase of exhaust gases. To allow the use of unleaded gasoline, restructuring of the engine and cleaning device for emission gases are necessary. To meet the 1975 target emission standard which is extremely stringent, the technical improvement in the engine structure alone will not be enough. The newly developed emission gas purification device must have superior endurance, no material limitations, economic advantages, and no new pollution. On the other hand, the improvement of gasoline without lead will require much more examination. For the moment, unleaded gasoline will be sold as of April 1974 (report dated March 1974); the unleaded gasoline octane value should be more than 88 of regular gas, and more than 95 of premium gas. For maintaining high octane but using no lead additives, the total gasoline quality will have to be improved, a decomposition device developed, and alkylation added. Aromatic and olefin hydrocarbons must be controlled as much as possible in the composition of gasoline. The valve seat recession shortens engine life and increases carbon monoxide and hydrocarbons in the emission gases. Some method of counteraction must be developed within this year. The 1973 experiments by the Committee on Automotive fuel studies showed that with an increase in the driving speed and decrease of engine exhaust gas emission, the valve seat recession was caused faster; and for trucks, the greater the load, the faster progress of valve seat recession. A phosphorus compound preventive for valve seat recession has been found but this requires more research against possible new pollution.

51418

APTIC NO. 69540

Dept. of the Interior, Washington, D. C., Office of Coal Research

COAL TECHNOLOGY: KEY TO CLEAN ENERGY (ANNUAL REPORT). 156p., 1974. 138 refs.

GPO

Office of Coal Research-sponsored research activities concerning coal gasification, solvent-refining of coal, coal-to-liquid conversion, the development of power generation systems with inherent pollution control, and mining reclamation studies are presented in an annual report. Projects involving the production of high-Btu and low-Btu gas include attempts to use caking types of coals for the Lurgi process, pilot plant programs to demonstrate the large-scale conversion of coal to substitute natural gas, carbon dioxide acceptor processes for gasification of lignite only, low-Btu processes in which CO₂ and methanation are eliminated, and combined cycle operations. A Coal-Oil-Energy-Development process, involving the pyrolysis of high-volatile bituminous coal in a multistage fluidized-bed reactor, is being studied for the possible production of high grade synthetic crude oil, pipeline-quality gas, and char. Power generation systems utilizing fluidized-bed combustor-gas turbine arrangements are being designed for in-

herent pollution control in coal burning processes. Research is also underway to utilize magnetohydrodynamics for the generation of electricity by forcing gases from coal fired at relatively high pressure through a magnetic field to produce an electric current.

51419

APTIC NO. 71583

(Inventor not given.)

INTERNAL COMBUSTION ENGINE HAVING A CATALYTIC CONVERTER FOR EXHAUST GASES. (Ford Motor Co., Ltd., London (England)) Brit. Pat. 1,361,910. 6p., July 31, 1974. (Appl. June 19, 1972, 15 claims).

A catalytic converter system for the reduction of hydrocarbon, carbon monoxide, and nitrogen oxide emissions from the exhaust of an internal combustion engine is described that allows for rapid heating of the catalyst to activation temperature during warm-up without exceeding the catalyst's maximum temperature during other modes of engine operation. An exhaust manifold is connected from the engine to the catalytic converter and maintains the average time rate of exhaust gas temperature change at the catalytic converter inlet substantially greater during preactivation than the average time rate of temperature change for exhaust gases at temperatures in excess of the activation temperature. The time rates of change are achieved with an exhaust manifold having a low thermal inertia and high heat transfer rate at elevated temperatures.

51420

APTIC NO. 71584

(Inventor not given.)

REMOVING NITROGEN OXIDES FROM GASES. (Toray Industries, Inc., Tokyo (Japan)) Brit. Pat. 1,361,913. 5p., July 31, 1974. (Appl. June 26, 1972, 8 claims).

A process of the catalytic reduction of nitrogen oxides to nitrogen is described that allows for maintenance of catalyst effectiveness until the carbon content of the catalyst is completely consumed. The gaseous mixture is contacted with a catalyst consisting of a carbon compound and an hydroxide of sodium or potassium at a temperature of 350-450°C, preferably. Oxygen may be present in the gaseous mixture. The concentration of the alkali metal hydroxide is from 2.0-20.0 wt% (based on the weight of carbon). The carbon catalyst may be composed of coke, semi-coke, petroleum coke, coal, activated carbon, charcoal, or fly ash. The gaseous mixture is passed through the catalyst bed at a space velocity of from 6000-80,000 volumes of gas/volume catalyst/hr.

51421

APTIC NO. 71932

Environmental Protection Agency, Ann Arbor, Mich., Technology Assessment and Evaluation Branch

EVALUATION OF THE LAFORCE-MODIFIED AMC HORNET. Preprint, 51p., Dec. 1974. 5 refs.

Fuel economy and emissions tests (1975 Federal Test Procedure, the Environmental Protection Agency Highway Cycle, and steady-state emissions tests) were performed on a LaForce-modified AMC Hornet. The modified internal combustion engine included the following changes: delayed inlet valve closing, milled cylinder heads, and separation of liquid fuel from the fuel-air mixture. The LaForce engine failed to meet 1975 Federal emission standards for hydrocarbons, carbon monoxide, and nitrogen oxides during EPA testing, and compared to the 1977 standards, the exhaust emissions were approximately 600% too high in unburned hydrocarbons, 565% too high in CO, and 65% too high in NO_x. Full-load steady-state tests conducted on an electric chassis dynamometer indicated that the modifications resulted in a power loss of about 20% compared to an unmodified 1974 Hornet in economy tune. The LaForce modified car delivered about 35% better fuel economy than the stock 1974 Hornet over the 1975 Federal Test Procedure; however, on an equal performance basis, the fuel economy of the LaForce car was not significantly different than that of a standard car. Data from acceleration tests conducted at the General Motors Proving Ground are also included.

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(Inventor not given.)

IMPROVEMENTS IN OR RELATING TO A POST-COMBUSTION REACTOR FOR EXHAUST GASES OF AN INTERNAL COMBUSTION ENGINE. (Automobiles Peugeot, Paris (France)) Brit. Pat. 1,369,628. 5p., Oct. 9, 1974. (Appl. Dec. 10, 1971, 14 claims).

A post-combustion reactor for the reduction of internal combustion engine emissions is described that provides for the free expansion of all component parts, thus eliminating expansion stresses associated with prior art devices. The apparatus consists of several concentric tubular walls that define a number of intercommunicating chambers. The concentric walls are connected to one another in pairs along a plane transverse to the reactor axis and at points disposed in a staggered relation from one pair of walls to the next. The tubular walls are in sliding relationship at their adjacent end portions.

51423

APTIC NO. 73964

National Transportation Center, Conrad and Associates, Pittsburgh, Pa. and Southwest Research Inst., San Antonio, Tex.

PROJECT CLEAN AIR 72. ING CON VERSION OF GM-71 SERIES DIESEL ENGINE (FINAL REPORT). Urban Mass Transportation Administration Work Unit PA-06-0005, Rept. UMTA-PA-06-0005-74-1, NTC-I-LG, 140p., 1974.

NTIS: PB 236585

Results from the design and testing of a procedure for converting the General Motors 6V-71 diesel engine (the standard engine for transit buses in the United States) to liquid natural gas operation are presented. The concept is completely feasible, both in terms of engine performance and exhaust emissions. Exhaust emissions can be reduced to levels well below those of commercial diesels and without the production of exhaust smoke and odor. Development work remains to be done to perfect the concept for a multi-cylinder engine. Both the potential of the concept and the remaining application problems, however, are presently defined. (Author summary modified)

51424

APTIC NO. 74042

HIGH AMMONIA PRICE MAKES NOX ABATEMENT PROFITABLE. *Eur. Chem. News*, 25(652):38, 43, Sept. 6, 1974.

Methods for controlling nitric oxide and nitrogen dioxide emissions from nitric acid plants are reviewed, with particular emphasis on the Grande Paroisse dual pressure extended absorption process. Methods for controlling nitrogen oxide emissions from existing plants include catalytic reduction and molecular sieve adsorption, though the latter process is at the pilot scale stage. The simplest way of reducing NOx emissions from new plants is to increase the absorption capacity and efficiency of conventional absorbers. The Grande Paroisse dual pressure extended absorption process successfully achieves this by allowing ammonia oxidation to occur between 3.5 and 5.5 km/sq cm and absorption between 6.5 and 15 kg/sq cm; these pressure levels result in a high ammonia conversion, a low platinum consumption, and a NOx emission of less than 200 ppm without air or diluent addition. The overall conversion efficiency is between 97 and 98% and at least 96% on an annual tank-to-tank basis, i.e., ammonia feed storage to nitric acid product storage. The additional investment for control equipment is justified at present ammonia prices. The battery limit investment for a medium-sized plant is approximately 10% greater than for a conventional plant.

AIR POLLUTION ABSTRACTS, OCTOBER 1975

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APTIC NO. 74172

Metropolitan Tokyo Bureau of Environment Protection (Japan) RESULTS OF SURVEY ON EXHAUST GAS EMISSIONS FROM LOW POLLUTION CARS UNDER OPERATING CONDITIONS. (Shiyo katei no okeru teikogaisha no haishutsu gasu ryo chosa kekka). Text in Japanese. 3p., Sept. 1974.

Exhaust gas emissions (carbon monoxide (CO), hydrocarbons (HC), nitrogen oxides (NOx)) from five Mazda Ruche (rotary piston) automobiles (LA22SB) equipped with the AP2 system, manufactured by Toyo Kogyo, were measured by 10-mode testing in July 1974, at the Metropolitan Tokyo Pollution Research Institute. Mileage on the cars varied from 10,000 to 50,000 km. The average values of emission for the five cars were: CO, 1.31 g/km; HC, 0.054 g/km; NOx, 0.424 g/km. During idling, the average CO concentration was less than 0.1%. Emissions meet 1975 emission standards for CO (average, 2.1 g/km; allowable maximum, 2.7 g/km); HC (average, 0.25 g/km; allowable maximum, 0.39 g/km); NOx (average, 1.2 g/km; allowable maximum, 1.6 g/km). In 1976, the allowable average NOx value will be 0.25 g/km; HC and CO standards will remain the same.

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APTIC NO. 75011

Ethyl Corp., Ferndale, Mich., Research Labs.

EFFECT OF CI 2 ON EMISSIONS FROM A LARGE POWER-GENERATING GAS TURBINE. 13p., 1974. 2 refs.

Effects of the addition of CI 2 to fuel on specific emissions from a gas turbine used to generate electrical power were determined. Manganese as CI 2 was added to No. 2 fuel oil at concentrations up to 50 ppm to determine its effect on total mass of particulate, particle size, carbon, smoke, inorganic and organic manganese, oxides of nitrogen, and oxides of sulfur at full and half turbine loads. At 25 ppm manganese, CI 2 in the fuel for the gas turbine-generator reduced the Bacharach smoke number from a baseline value of 5.3 to 3.0, where the smoke is invisible to the eye. At the same time, total particulate weight was reduced by 35-50%, and carbon was reduced by 75%. At 50 ppm manganese, CI 2 reduced total particulate an additional 20% (55-70% reduction) and essentially eliminated carbon. There was little or no effect of CI 2 on emissions of NOx and SOx. Only a very small portion of the CI 2 survived the combustion process as organic manganese. Due to a faulty collection device, no particle size data were obtained. (Author summary)

1973

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APTIC NO. 69376

Bienstock, D., P. D. Bergman, J. M. Henry, R. J. Demski, J. J. Demeter, and K. D. Plants

AIR POLLUTION ASPECTS OF MHD POWER GENERATION. Preprint, Stanford Univ., 10p., 1973. 22 refs. (Presented at the Engineering Aspects of Magnetohydrodynamics Symposium, 13th, March 26-28, 1973, Paper VII.)

Magnetohydrodynamics has very low air pollution potential. In pilot plant tests in which a 2.2 wt% sulfur coal was burned in a cyclone furnace at 200 lbs/hr and 4000 F at a seed concentration of 1 g mole potassium carbonate/kg coal, 99.8% removal of sulfur dioxide was obtained with only 5 ppm SO2 in the gaseous effluent. Operating the combustor with 95% of stoichiometric oxygen and ambient air admitted at 2000 F caused 150 ppm nitrogen oxide emissions or 0.12 lbs nitrogen dioxide/million Btu. This is a 94% reduction from single-stage operation at 102% stoichiometric oxygen. Since the gas cooling rate in the experimental unit was higher than projected for a commercial plant, a commercial plant should have even lower NOx emissions. A mathematical model using the Zeldovich mechanism was adequate to follow the NOx decomposition in the air-rich system; and extended Zeldovich was more ap-

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appropriate in the fuel-rich regime. Experiments showed that at high slagrejection rates of greater than 90%, recovery of the potassium seed by aqueous extraction was better than 99%. Cost estimates of a 100 MWe magnetohydrodynamics-steam plant, in which the spent seed is recovered by aqueous extraction and then regenerated with reducing gases to remove the sulfur, showed an operating cost of the seed recovery/sulfur removal steps of 8% of the overall power costs of 10.3 mills/kwh. Seed make up costs have a marginal impact even at K recoveries as low as 95%. The capital costs of SO₂ removal are \$10.4/kw, approximately 0.2 of that in conventional power plants. (Author abstract modified)

51428

APTIC NO. 69492

Bowlus, D. A., G. A. Brown, and G. J. Silvestri

THE WANKEL ROTARY ENGINE AS A STEAM EXPANDER. *American Chemical Society, Washington, D. C.; American Inst. of Aeronautics and Astronautics; American Society of Mechanical Engineers; Inst. of Electrical and Electronic Engineers; American Nuclear Society; and Society of Automotive Engineers, Proc. Intersociety Energy Conversion Eng. Conf., 8th, Philadelphia, Pa., 1973, p. 1-7. 9 refs. (Aug. 13-17.)*

The Wankel rotary engine was used in a positive displacement expander application. Studies indicated that the Wankel engine yields equivalent performance to a piston-cylinder expander at considerably reduced engine size and weight. The reason is that the Wankel geometry results in equivalent displacement volumes at smaller overall engine sizes. These observations were confirmed in internal combustion applications. Although there are theoretical advantages, practical matters such as sealing, valving, heat loss, and friction effects may make the Wankel less attractive; thus, an experimental program intended to evaluate the Wankel expander was initiated. To accomplish this, an existing internal combustion engine was redesigned to operate as an expander. The rotating parts of an RCI-60 engine were obtained. By fabricating new end covers and a new trochoid housing to accommodate necessary valving and porting, an expander engine can be made. The design and analysis required for the Wankel expander are described. Of primary concern is the valving, porting, and ducting needed to reproduce a typical pressure-volume diagram of a 600 psia, 1000 F steam cycle. A new rotary valve design that assures the starting of the engine is being fabricated. Also, a digital computer simulation with steam as the working fluid is used to assess design concepts. The real fluid mechanic models of the charging and emptying processes and realistic heat transfer models based on local surface-to-volume relationships are discussed. (Author abstract modified)

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APTIC NO. 73876

Breen, Bernard P. and Thomas C. Kosvic

A SURVEY OF NITRIC OXIDE CONTROL FOR OIL FIRED BOILERS. *Preprint, American Society of Mechanical Engineers, New York, 21p., 1973. 7 refs. (Presented at the American Society of Mechanical Engineers, Air Pollution Control Division, National Symposium, 3rd, Philadelphia, Pa., April 25, 1973, Paper P-120.)*

Nitric oxide emission data for oil-fired boilers are discussed in relation to the effectiveness of various controls and problems associated with oil firing. Reductions in NO emissions generally in range of 30-50% can be achieved by using fuel-rich off-stoichiometric firing techniques. The reductions are less than those which have been achieved with gas-fired boilers because of the reduced operating flexibility. The same type of spatial and operating problems on both oil and gas boilers, though additional problems of boiler cleanliness, fuel tip changes, and the incipience of smoking threshold are encountered with oil firing. (Author conclusions modified)

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APTIC NO. 74277

Chwalibog, Henryk

PROTECTION OF THE ATMOSPHERE AGAINST SULFUR DIOXIDE EMISSIONS. (*Uwagi o ochronie atmosfery przed emisją SO₂*). Text in Polish. *Chemik*, 26(9):342-347, 1973. 7 refs.

The control of sulfur compound emissions by catalytic oxidation is discussed and compared to Claus method. The oxygenation method eliminates almost all sulfur emissions and is significantly less expensive than Claus methods. Industrial 90 to 95% oxygen is utilized for burning hydrogen sulfide. Wet catalysis results in a mixture of hydrogen sulfide, sulfur trioxide, water, and traces of unreacted sulfur dioxide. The resulting sulfuric acid concentration is 82 to 90% at condensation temperatures of 203 to 255 C. The thermal energy created by the chemical combustion, catalysis, processing, condensation, and solubilization of the sulfuric acid is recuperated in the form of water vapor. Another variant of the method is the utilization of the combustion gas in the production of sulfuric acid in a tower system. Equal amounts of 92% sulfuric acid and 78 to 80% sulfuric acid can be produced at lowest cost.

51431

APTIC NO. 74037

Dibbs, H. P. and P. Maier

METHODS FOR THE REMOVAL OF SULPHUR FROM COAL. *Air Pollution Control Directorate, Ottawa (Ontario), Engineering Div., Rept. EPS 3-AP-73-3, 68p., March 1973. 136 refs.*

Physical and chemical methods for the removal of sulfur from coal are discussed. The theoretical upper limit of sulfur removal by physical methods is established by the organic sulfur content of the coal. Significant pyritic sulfur reductions can be achieved by the use of fine grinding and physical separations at specific gravities close to that of coal. Good efficiency for pyritic sulfur removal is usually accomplished with low yields of clean coal, and choice of a method most suitable for a given coal is dependent on the proposed application of the product and on various factors inherent in the type of coal. The complete removal of pyritic sulfur from coal may be achieved either by the dissolution of the coal in an organic solvent, followed by filtration to remove inorganic materials and subsequent reconstitution of the hydrocarbon phase, or by methods based on the selective leaching of pyrite from the coal matrix. Solvent refining methods, possess the unique advantage of removing virtually all inorganic material from coal while giving a significant reduction in its organic sulfur content. (Author summary modified)

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APTIC NO. 75228

Green, George P.

OPERATING EXPERIENCE WITH PARTICULATE CONTROL DEVICES. *Preprint, American Society of Mechanical Engineers, New York, Air Pollution Control Div., 15p., April 1973. (Presented at the American Society of Mechanical Engineers, Air Pollution Control Division, National Symposium, 3rd, Philadelphia, Pa., April 1973.)*

Operating experience associated with the control of particulate emissions from steam plant units burning low sulfur, high-resistivity, western coals is reviewed. Initially disappointing collection efficiencies with electrostatic precipitators were improved by conditioning the flue gas with sulfur trioxide such that its concentration in the gas to be treated was 20 ppm. Collection efficiencies for eight different units ranged from 37.5-94.0% before flue gas conditioning and from 51.2-97.2% after conditioning with SO₃. Wet scrubbing with lime-limestone slurry proved effective in cases where electrostatic precipitation was not practical. Scrubber inlet and outlet grain loadings varied from 0.259-0.406 and 0.0113-0.489 grains/dry cu ft, respectively.

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APTIC NO. 69832

Gregory, Derek, P. and Robert B. Rosenberg

SYNTHETIC FUELS FOR TRANSPORTATION AND NATIONAL ENERGY NEEDS. Preprint, Society of Automotive Engineers, 16p., 1973, 22 refs. (Presented at the Society of Automotive Engineers, National Meeting, Detroit, Mich., May 15, 1973.)

The possibilities of making methanol, ethanol, hydrogen, and ammonia for use as vehicle fuels is examined. In the short term (beginning in about 8-10 years and having a significant impact within 15 years), oil importation requirements could be reduced by developing an automobile fuel derived from coal. Synthetic gasolines produced from coals will not alleviate pollution problems; these will have to be solved by engine or exhaust system modifications. Methanol from coal may require simpler and cheaper plants; when used as a fuel, it may be cleaner. Methanol can be blended into existing gasolines to stretch available energy supplies without major engine modifications, while future vehicles can be designed to accommodate pure alcohol fuels. In the long run (beyond 1990), major consideration must be given to the use of hydrogen as an automotive fuel. The major problem is the storage tank on the vehicle. This might be solved by using either cryogenic liquid or some form of hydride or ammonia. Considerable research is needed in this area. The incentive for such research is the potentially unlimited quantities of such fuels. (Author conclusions)

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APTIC NO. 73764

Hamza, H. A. and R. Zrobok

THE EMR PROCESS FOR SULPHUR REDUCTION OF CAPE BRETON COALS: A FLOCCULATION STUDY. Canadian Dept. of Energy, Mines, and Resources, Ottawa, Metals Reduction and Energy Centre, Rept. MREC 73/112 WRL, 27p., Dec. 1973, 2 refs.

Flocculant selection tests were conducted on an effluent produced by the washing of high-sulfur coal from Glace Bay, Nova Scotia. A total of 51 commercial reagents were prescreened for testing, and eight were selected as being the most efficient. Among these eight, six were anionic and two were cationic. The maximum settling rate obtained amounted to an increase of more than 280 times that of the unflocculated material. The effect of %-solids in the effluent over the range of 2-8% was not too pronounced. However, the initial settling rate for some reagents was induced by as much as 1/2 to 3/4 when the %-solids was increased from 2-8%. (Author conclusions modified)

51435

APTIC NO. 69831

Hazard, Herbert R., Robert D. Fischer, and Clarence McComis

LOW EMISSION BURNERS FOR AUTOMOTIVE RANKINE CYCLE ENGINES. Battelle Memorial Lab., Columbus, Ohio, Columbus Labs., Office of Air and Water Programs Contract EHS 70-117, Rept. APTD-1516, 47p., April 1973, 8 refs.

NTIS: PB 238093/AS

Burners of four different designs for application to automotive Rankine cycle engines were optimized and tested for performance and emission characteristics as part of a combustion technology program designed to develop a full-scale burner for such applications. A burner design which met all of the contract requirements, including emission values of 16.25 g/kg fuel for carbon monoxide, 1.38 g/kg for nitrogen oxides (as nitrogen dioxide), 0.48 g/kg hydrocarbons, and 0.10 g/kg particulates, could be operated over the firing range from 110 to 1 lb fuel/hr. It was a rich primary burner having internal cooling of the primary zone with boiler tubes. The effect of exhaust gas recirculation on NOx emission was explored using the above burner configuration and another burner; NOx emissions were significantly reduced in both cases. The effect of fuel nitrogen was investigated by firing fuel doped with vary-

ing amounts of pyridine into another burner configuration. A significant proportion of the nitrogen in the pyridine was converted to NOx, with the proportion varying from about 90% for 0.01% fuel nitrogen to about 53% with 0.44% fuel nitrogen. A significant proportion of fuel nitrogen occurring in natural organic compounds appeared to be convertible to NOx in a similar manner.

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APTIC NO. 69484

Kamiya, K.

POLLUTION AND NAPHTHA PROBLEMS IN JAPAN. American Inst. of Chemical Engineers, 6p., 1973. (Presented at the American Institute of Chemical Engineers, National Meeting, 74th, New Orleans, La., March 11-15, 1973, Paper 3a.)

Because of high sulfur oxide levels in some areas of Japan, measures to lower sulfur content in naphtha to produce a clean fuel are being studied. The countermeasures for lowering the sulfur content of fuels in Japan can be broadly divided into the lowering of the sulfur content of imported crude oil and heavy oil, conversion of fuels, and desulfurization techniques. The following fuels can be developed as clean fuels: liquefied natural gas, natural gas liquid, crude oil, naphtha, and crude methanol. Desulfurization techniques include desulfurization of heavy oil, smoke desulfurization, and desulfurization of heavy residuum oil through gasification. Among the measures for lowering the sulfur content, the use of crude oil and naphtha as fuel exerts a strong influence on feedstock for the petrochemical industry of Japan. The petrochemical industry insists on the maintenance of the same level of yield rate as in the domestic production of naphtha, limitations of imports of naphtha, securing of quality naphtha for use as a feedstock, and aggressive promotion of sulfur content lowering by smoke desulfurization.

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APTIC NO. 74269

Keairns, D. L., D. H. Archer, R. A. Newby, E. P. O'Neill and E. J. Vidi

EVALUATION OF THE FLUIDIZED-BED COMBUSTION PROCESS. VOLUME IV - FLUIDIZED-BED OIL GASIFICATION/DESULFURIZATION (FINAL REPORT). Westinghouse Research Labs., Pittsburgh, Pa., Environmental Protection Agency Contract 68-02-0217, ROAP 21ADB-09, Program Element 1AB013, Rept. EPA-650/2-73-048d, 362p., Dec. 1973, 35 refs.

NTIS: PB 233 101/AS

Fluidized bed gasification can be applied to power generation to produce a clean, low-Btu fuel gas -- 200 to 500 Btu/scf. In a fluidized bed gasifier, oil is added to a simple, open, fluidized bed of limestone or dolomite with sufficient air -- 15-25% of stoichiometric to maintain the bed at 1600 F and to react with the oil to produce a fuel gas. The limestone or dolomite removes sulfur from the fuel gas during the gasification process. The evaluation of an atmospheric-pressure fluidized bed oil gasification system is given, and the development of a 50 MW demonstration plant and development program is described. The process, operating variables, and economics of oil gasification for combined cycle power generation are discussed. Studies of the sulfidation of calcined limestone and dolomite and waste disposal are also reviewed. Capital cost of a retrofit, once-through oil gasification system may be 50-70% less than a retrofit stack gas cleaning system. The capital cost of a new gasification system may be 20-50% less. Total plant cost savings may be 4%. Fuel costs will be 20-50% less than stack gas cleaning, low-sulfur oil, or desulfurized oil. Total energy cost savings may be as high as 3%. Pressurized fluid bed oil gasification with combined cycle power generation has the potential to burn high-sulfur residual fuel oils, meet environmental emission standards, and deliver energy at costs 20% less than power generation with clean fuels. Atmospheric-pressure fluid bed oil gasification will meet environmental emission standards and will reduce incremental energy costs by up to 50% compared with stack gas cleaning based on system economics and pilot plant studies.

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APTIC NO. 73877

McGuire, W. F., P. F. Thompson, and L. L. Smith

THEORY AND APPLICATION OF NITRIC OXIDE EMISSION REDUCTION IN UTILITY BOILERS. Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 36p., 1973. 9 refs. (Presented at the Air Pollution Control in the Southwest, Annual Symposium, 1st, College Station, Tex., Nov. 5-7, 1973.)

The kinetics of nitrogen oxide formation and controlling factors as they apply to utility boilers are presented along with field results achieved with off-stoichiometric combustion. Practical control approaches discussed include: lowered air preheat, water or steam injection, flue gas recirculation, and off-stoichiometric combustion. The application of the latter technique to a utility boiler resulted in nitric oxide reductions from 30-80%. Limiting factors included excessive localized carbon monoxide emissions and flame carry-over into the furnace backpass. Analyses of basic boiler designs indicated that burner type, burner zone heat release area, burner spacing, and windbox configurations were the predominant parameters affecting NOx emissions. (Author abstract modified)

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APTIC NO. 75137

Miller, D. R., H. R. Null, and Q. E. Thompson

OPTIMUM WORKING FLUIDS FOR AUTOMOTIVE RANKINE ENGINES. VOLUME I - EXECUTIVE SUMMARY. Monsanto Research Corp., St. Louis, Mo. and Sundstrand Aviation, Rockford, Ill., Environmental Protection Agency Contract 68-04-0030, Rept. APTD-1563, 36p., June 1973.

NTIS: PB 239247/AS

Various working fluids for automotive Rankine-cycle engines were evaluated in terms of availability, compatibility, thermal stability, cycle efficiency, cold start ability, applicability in principal engine types, owner cost, toxicity, flammability, and environmental hazard. The best Rankine candidate fluid, designated RC-1, was 60 mol% pentafluorobenzene and 40 mol% hexafluorobenzene. The best binary choice, designated RC-2, was 65 mol% water and 35 mol% 2-methylpyridine. Fluid RC-1 was used to optimize an engine with a turbine expander, and fluid RC-2 was used to optimize an engine with a reciprocating expander. Both fluids appeared appropriate for automotive-size engines; the real cycle efficiencies for RC-1 and RC-2 were 21.0 and 22.2%, respectively. The inhalation hazards for both candidates appeared comparable to those of gasoline.

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APTIC NO. 75138

Miller, D. R., H. R. Null, and Q. E. Thompson

OPTIMUM WORKING FLUIDS FOR AUTOMOTIVE RANKINE ENGINES. VOLUME II - TECHNICAL SECTION. Monsanto Research Corp., St. Louis, Mo., Environmental Protection Agency Contract 68-04-0030, Rept. APTD-1564, 202p., June 1973. 61 refs.

NTIS: PB 239248/AS

Various working fluids for automotive Rankine engines were evaluated in terms of cycle efficiency, toxicity, flammability and combustion products, and stability. Two final candidate fluids were selected as being the most desirable: a 60/40 mol% mixture of pentafluorobenzene/hexafluorobenzene, designated as RC-1, and a 65/35 mol% mixture of water/2-methylpyridine, designated as RC-2. Rat inhalation studies revealed 4-hour median lethal concentrations of 16,000 ppm and 8000 ppm for RC-1 and RC-2, respectively. Combustion tests involving the burning of the working fluids with propane-air demonstrated the production of relatively high concentrations of carbon monoxide (612 + or - 66 ppm) and hydrogen fluoride (746 + or - 80 ppm) for RC-1; unburned hydrocarbons were also high for RC-1 (935 + or - 72 ppm). Combustion of RC-2 was more complete and resulted in much lower concentrations of the above components; however, nitrogen cyanide and nitrogen oxides were emitted in amounts of 0.5 and 79 + or - 6 ppm, respectively. Fluid RC-1 came nearest to satisfying the au-

tomotive organic working fluid requirements, with fluid RC-2 being selected as a back-up candidate for automotive use.

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APTIC NO. 75139

Miller, D. R., H. R. Null, Q. E. Thompson, A. C. Pauls, and J. A. Conover

OPTIMUM WORKING FLUIDS FOR AUTOMOTIVE RANKINE ENGINES. VOLUME III - TECHNICAL SECTION - APPENDICES. Monsanto Research Corp., St. Louis, Mo., Environmental Protection Agency Contract 68-04-0030, Rept. APTD-1565, 251p., June 1973. 14 refs.

NTIS: PB 239249/AS

A series of appendices provide technical details on experiments performed to establish optimum working fluids for automotive Rankine cycle engines. Procedures and data are given for the thermodynamic properties of the final candidate fluids, acute vapor inhalation experiments with rats, the flash and fire points of the candidate fluids, a hot compartment spray ignition test, acute skin absorption tests with rabbits, and cycle efficiency computations. Computer programs used during the evaluation are also presented.

51442

APTIC NO. 69595

Miller, William L.

GEOTHERMAL ENERGY AND THE ENVIRONMENT.

Colorado Geological Survey, Denver, Dept. of Natural Resources, Geotherm. Energy Colo. Proc. Symp., Denver, Colo., 1973. (Colorado Geological Survey Bulletin no. 35), p. 61-70. 8 refs. (Dec. 6.)

The future development of geothermal energy resources in the U. S. and throughout the rest of the world can be expected to affect the integrity of the surrounding environment in varying ways and to varying degrees. Before development can begin, all the environmental implications must be considered. Probably the single greatest environmental impact will be the disturbance of the land and the resulting changes in its utilization. The withdrawal of large volumes of fluids from hot-water geothermal reservoirs could cause subsidence of the land surface as a result of reduced fluid pressure. An associated effect of the reinjection of geothermal fluids and of subsidence might be an increase in seismic activity. Well blowouts or uncontrolled, sudden, and violent release of steam or hot water into the atmosphere could cause safety hazards, pollution of air and water, noise, and partial resource loss. Geothermal fluids normally contain dissolved gases, including hydrogen sulfide, carbon dioxide, carbon monoxide, methane, ammonia, and mercury vapor. The gases are released to the atmosphere with the steam when the fluid flashes at the surface during the bleeding and venting of the wells, at the gas ejector vents on the condensers, and at the cooling towers after generation of power. These gases may be corrosive and hazardous to the safety and health of persons living and working near the plant. The production of potentially valuable associated geothermal by-products, demineralized water, and mineral salts, could have beneficial consequences. Fish and wildlife in the area also might be affected.

51443

APTIC NO. 73887

Miyamoto, Masanori, Kazuo Tsukabayashi, and Takao Genda

STUDY ON EXHAUST GAS DESULFURIZATION BY ZEOLITIZATION OF DIATOMACEOUS EARTH IN NOTO AREA, PART I, SYNTHESIS OF ZEOLITE. (Noto keisodo no zeoraitoka ni yoru haen datsuryu ni kansuru kenkyu, dai 1-ho, zeorito no gosei). Text in Japanese. Ishikawa-ken Kogyo Shikenjo Nenpo (Annu. Rep. Ind. Res. Inst., Ishikawa Prefect.), vol. 1973:101-103, 1973.

An A-type Zeolite, which can be used for desulfurization of flue gases, was synthesized from the diatomaceous earth produced from the Noto area in Ishikawa Prefecture. The diatomaceous earth was mixed with sodium hydroxide solution and then fused. The fused product was crushed and mixed

with sodium hydroxide, sodium alumina, and water for a two-step aging; at normal temperature and high temperature. After the aging, the A-type Zeolite was produced by filtering, rinsing, and drying, in that order, the aged product. The chemical composition of the synthesized Zeolite was silicon dioxide (36.24%), aluminum trioxide (33.82%), ferric oxide (1.96%), and sodium oxide (13.77%), and others (11.59%). The conditions of the fusion process were examined and the fusion made at 800 C for 90 min gave the best result, producing sodium metasilicic acid as an intermediate product in the Zeolite synthesis. A two-step aging gave the effective production of 4A-type Zeolite. The best aging conditions were first heating at 40 C for 24 hr and then at 90 C for 6 hr.

51444

APTIC NO. 73905

Miyamoto, Masanori, Kazuo Tsukabayashi, and Takao Genda.
STUDY OF EXHAUST GAS DESULFURIZATION BY ZEOLITIZATION OF DIATOMACEOUS EARTH IN NOTO AREA, PART II, EXHAUST GAS DESULFURIZATION BY ZEOLITE. (Noto keisodo no zeoraitoka ni yoru haiei datsuryu ni kansuru kankyu, dai 2-ho zeorito ni yoru haiei datsuryu). Text in Japanese. Ishikawa-ken Kogyo Shikenjo Nenpo (Annu. Rep. Ind. Res. Inst., Ishikawa Prefect.), vol. 1973:104-106, 1973.

The desulfurization efficiency of Zeolites was studied for the effect of moisture contents in flue gases and amount of Zeolite in the adsorption bed. Zeolites used were the laboratory X and A types of 5 mm diameter synthesized from diatomaceous earth in the Noto area, and the commercial X and A types of 3.2 mm diameter (Union Showa CO.). An activated carbon was also used for comparison. An artificial flue gas (1170 ppm sulfur dioxide, 5.0% oxygen, 11.4% carbon dioxide, and balance nitrogen) and gases of B-type heavy oil combustion products were used. An infrared SO₂ analyzer and Orsat analyzer for CO₂ and O₂ were employed. The desulfurization efficiency of the X-type Zeolite was better than that of the A-type Zeolite for the flue gas without moisture content. The Zeolite activity lasted longer at a temperature of adsorption bed of 100 C than at 200 C, and the desulfurization efficiency at the temperature 100 C was two times better than that at 200 C after 1 hr continuous adsorption. The filling amount of Zeolite in the adsorption bed also affected the Zeolite activity under the same conditions of flue gas flow. When 25 g Zeolite was placed in the bed, no SO₂ was detected from the bed effluent gas for 3 hr, however appreciable amounts of SO₂ were detected after 20 min when 10 g Zeolite was loaded on the bed. Under the same amount of Zeolite in the bed, therefore, the desulfurization efficiency drops considerably with increased amount of flue gas to be treated. Since the desulfurization efficiencies obtained by the laboratory Zeolites were comparable to those of the commercial Zeolites, the diatomaceous earth of the Noto area can be used for Zeolite synthesis.

51445

APTIC NO. 69449

Morgan, Dean, Parimal Patel, Edward Doyle, Robert Raymond, Ravinder Sakhuja, and Ken Barber.
LABORATORY TEST RESULTS LOW EMISSION RANKINE-CYCLE ENGINE WITH ORGANIC-BASED WORKING FLUID AND RECIPROCATING EXPANDER FOR AUTOMOBILES. Preprint, Thermo Electric Corp., Waltham, Mass., Research and Development Center and Environmental Protection Agency, Ann Arbor, Mich., Div. of Advanced Automotive Power Systems Development, 7p., 1973 (?).

A low-emission Rankine-cycle propulsion system for automobiles was developed using an organic-based working fluid, Fluorinol-85 and a reciprocating expander. The system was designed to fit into the production Ford Galaxie with modifications required only to the engine compartment and to the grill/bumper for installation of the Rankine engine. A full-scale system was constructed and tested in a laboratory. During the laboratory testing, actual operating conditions were duplicated as closely as possible. System power and efficiency could be

measured over the complete range of operating conditions expected in the vehicle. Measurements concentrated on development of the steady-state hp/speed/efficiency map of the system. Expander testing has been underway since Oct. 1972 on both a single cylinder test expander and the V-4 expander for the system. The system is described, and test results are given. Acceleration performance and driving cycle fuel consumption predictions are presented. The system can be competitive in performance and fuel economy with the 1972 351 cu in. displacement internal combustion engine. Measured emissions from system tests confirmed the potential of the Rankine-cycle engine to give emission levels substantially lower than the 1976 Federal standards. (Author abstract modified)

51446

APTIC NO. 75312

Pollak, Kazimierz and Janusz Liberacki.
DRY COKE QUENCHING, A METHOD FOR IMPROVING THE QUALITY OF THE COKE AND PROTECTING THE ENVIRONMENT. PART I. (Suche gaszenie koksu jako sposob poprawy jakosci koksu i ochrony srodowiska). Koks, Smola, Gaz, no. 10, 1973. 19 refs. Translated from Polish. Leo Kanner Associates, Redwood City, Calif., 18p., Jan. 1975.

A dry coke quenching process that results in improved coke quality and less air pollution is described. Hot coke from the oven chamber is received by a special quenching car which is suitable only for dry quenching. The car consists of a flat bed on which a 4 by 6 m coke box lined with cast iron is mounted. The quenching chamber consists of a cylindrical shaft of 320 cu m volume capacity that is laid out with chamotte bricks. Gases at a temperature of 800 C escape through a ring channel below the preliminary coking chamber and enter the boiler after preliminary dedusting in a dust separator where the temperature is reduced to 180 C. The gas is subsequently dedusted in a cyclone dust extractor. Nitrogen obtained as an oxidation by-product is introduced into the circulation for explosion safety and results in a 5-6% decrease in the carbon monoxide content of the gas. About 16 kg dust/ton coke is formed during the coke quenching and is carried away with the gases (0.5 g/cu m).

51447

APTIC NO. 69369

Rabenhorst, David W.
SUPERFLYWHEEL ENERGY STORAGE SYSTEM. National Science Foundation, Washington, D. C., Research Applied to National Needs, Wind Energy Convers. Syst., Workshop Proc., Washington, D. C., 1973, p. 137-145. 3 refs. (June 11-13.)

NTIS: PB 231341

A new superflywheel concept has been developed which offers greatly improved safety and performance. Its configuration allows sufficient distribution of failed particles in size, direction, and total time; thus, effective failure containment appears to be a practical objective. The new energy storage system will considerably enhance the performance of future onsite energy systems such as solar and wind energy systems. Its chief advantages will be lower total cost and freedom of maintenance of the storage system. It will have several times the operating life of lead-acid batteries, and will readily accept the high-power peaks associated with heating and air conditioning equipment.

51448

APTIC NO. 74225

Ramsdell, Roger G., Jr.
PRACTICAL DESIGN PARAMETERS FOR HOT AND COLD ELECTROSTATIC PRECIPITATORS. Preprint, 10p., 1973. 5 refs. (Presented at the American Power Conference, Annual Meeting, 35th, Chicago, Ill., May 8-10, 1973.)

Design considerations involved in the selection of cold versus hot electrostatic precipitators are discussed. An examination of collection efficiency design curves for cold precipitators

CONTROL METHODS

reveals that when coal fly ash resistivity is much greater than 10,000 megohm/cm, the precipitator is operating in a marginal zone with considerably reduced efficiency. The hot precipitator which operates at a flue gas temperature of about 600 F is, on the other hand, in the ideal precipitation zone under these conditions. Thus, hot precipitators are more economical for the collection of fly ash from coal containing approximately 1.0% sulfur, while the cold precipitator is well suited for higher sulfur coals. Other advantages of the hot precipitator include less fouling of the air preheater and the effect of high operating temperature on the collection and conveying of oil ash.

51449

APTIC NO. 74271

Reichl, Eric H.

COAL IN POWER GENERATION. *Energy Dig.*, 2(6):2-6, Nov.-Dec. 1973.

Trends in technology for the clean protection of electricity from coal in the United States are discussed. Stack gas scrubbing, which will be used commercially in numerous plants by 1980, is going to result in a severe reduction in thermal efficiency, requiring from 600-700 Btu/kW/hr. Investment cost is estimated to range from \$40-75/kW. Coal gasification is an important alternative for clean power generation from high sulfur coals, though research and development programs for gasifiers are much smaller in scope than those for stack gas scrubbing. Low Btu gas is essentially aimed at new power plants, notably the combined cycle units for gas turbine/steam turbine combinations. Research is also being directed toward the development of fluidized bed combustion processes, and a 30 MW atmospheric pressure, fluidized bed is presently committed. Pressurized versions of the fluidized bed are also being studied. Coal liquefaction is an alternative that removes the entire burden of development and commercialization away from the power plant. Investments for liquefaction are expected to range around \$6-8000/daily barrel of liquid product. The overall thermal efficiency of liquefaction is estimated to be from 68-72%. Estimated costs for producing liquid products are projected to soon be about the same as those for petroleum-based boiler fuels.

51450

APTIC NO. 73716

Schneider, H.

CATALYTIC AND THERMAL EXHAUST AIR PURIFICATION. (*Katalytische und thermische Abluftreinigung*). Text in German. *Ind.-Anz.*, 95(24):472-473, 1973.

Methods for the thermal and catalytic destruction of obnoxious or poisonous gases are described. An effective catalytic unit uses ceramic honeycomb pipes impregnated with platinum; the gases are introduced either directly or are first heated in a heat exchanger to 350-450 C. Under certain conditions combustion alone can be used for elimination of toxic gases. One such device consists of concentric cylinders arranged such that the pollutant gases and air are mixed by turbulence; the residence time is 0.03-0.1 sec for good pollutant removal.

51451

APTIC NO. 73763

Visman, J.

APPLICATION OF THE EMR PROCESS FOR SULPHUR REDUCTION OF CAFE BRETON COALS. *Canadian Dept. of Energy, Mines, and Resources, Ottawa, Metals Reduction and Energy Centre, Rept. MREC 73/22 WRL*, 28p., Feb. 27, 1973. 4 refs.

The results of pilot tests at a mechanical coal cleaning plant processing coal of 1.8% sulfur content are presented. Raw coal is crushed to pass a 1/2 in. screen in a hammermill, with the nominal top size of the crushed product being 1/8 in. The prepared raw coal is then cleaned with water, using 8-inch compound water cyclones in a two-stage operation. Dewatered clean coal is passed through a pusher centrifuge and loaded into a dual bin. An average sulfur reaction of 0.72% is indicated from 12 tests run to date.

51454

APTIC NO. 72006

51452

Honda Motor Co., Ltd.

TECHNICAL REPORT ON HONDA CVCC SYSTEM. In: *Decision of the Administrator of the Environmental Protection Agency Regarding Suspension of the 1975 Auto Emission Standards, Part 2. 93rd Congress (Senate), First Session, Serial 93-H9, p. 519-558, May 14, 17, 18, and 21, 1973. (Hearings before the Subcommittee on Air and Water Pollution of the Committee on Public Works.)*

The design, operation, and emission characteristics of the Honda compound vortex controlled combustion stratified charge engine are described. The engine is capable of meeting 1975 Federal emission requirements without using an exhaust gas treatment. Hydrocarbon, carbon monoxide, and nitrogen oxide emissions from a two-liter Honda CVCC (manual transmission) are: 0.17, 2.25, and 0.89 g/mi as measured over the 1975 Federal Test Procedure. Data are also given for an experimental CVCC-Vega (140 cu in. engine) and for a CVCC-Impala (350 cu in. V-8).

51453

APTIC NO. 72008

Curtiss-Wright Corp., Wood-Ridge, N. J.

A REPORT ON THE ROTARY ENGINE. In: *Decision of the Administrator of the Environmental Protection Agency Regarding Suspension of the 1975 Auto Emission Standards, Part 2. 93rd Congress (Senate), First Session, Serial 93-H9, p. 625-702, May 14, 17, 18, and 21, 1973. 75 refs. (Hearings before the Subcommittee on Air and Water Pollution of the Committee on Public Works.)*

Developments in the Curtiss Wright rotary combustion engine are reviewed along with emissions data obtained during several tests. Typical exhaust emission results (California Cycle) for a Ford Galaxie powered with an RC2-60U3 rotary engine and an exhaust reactor ranged from 0.77-1.47 % for carbon monoxide, 378-607 ppm for nitrogen oxides, and 90.3-108 ppm for hydrocarbons. Data are also presented to illustrate that the rotary engine without pollution control is inherently as clean or cleaner than conventional piston type engines. Research on the stratified charge rotary engine is also reviewed.

51454

APTIC NO. 75074

National Academy of Sciences, Washington, D. C., Committee on Motor Vehicle Emissions

NAS REPORT ON TECHNOLOGICAL FEASIBILITY OF 1975-76 MOTOR VEHICLE EMISSION STANDARDS. AUTOMOTIVE SPARK IGNITION ENGINE EMISSION CONTROL SYSTEMS TO MEET THE REQUIREMENTS OF THE 1970 CLEAN AIR AMENDMENTS (PANEL REPORT). *Office of Air and Water Programs Contract 68-01-0402, 114p., May 1973.*

NTIS: PB 224862

Data available on the performance of emission control systems for spark-ignition engines that approach the degree of control required to meet the 1975 and 1976 automobile emission standards as required by the 1970 Clean Air Amendments are summarized. The emission controls investigated include: engine operation modifications, thermal reactors, oxidation and reduction catalysts, exhaust gas recirculation, secondary air systems, and fuel modifications. Also included are alternative engine designs such as the stratified charge concept, Wankel rotary engines, divided combustion chamber engines, and dilute combustion engines. Conventional carbureted spark-ignition engines with modifications and oxidation catalysts for hydrocarbon and carbon monoxide emissions control appear capable of meeting the 1975 standards, although the hydrocarbon and CO emissions generally increase with mileage because of catalyst deterioration. The durability of nitrogen oxide catalysts for meeting the 1976 standards is poor and its potential for achieving adequate emission control is questionable.

51455

51455

APTIC NO. 75076

NON-POLLUTING ENGINE. In: *Down-To-Earth Applications of Rocket Engine Technology*. Rockwell International Corp., Canoga Park, Calif., Rocketdyne Div., p. 3-6, 1973 (?).

NTIS: N74-31275

A non-polluting engine for generating electricity is described that is based on technology established in the rocket engine industry. The engine, a modified Apollo/Saturn V moon rocket power plant, has a combustion system that operates on a mixture of a light hydrocarbon and liquid oxygen. This mixture burns in a high-pressure chamber just as liquid fuel and liquid oxygen burn in rocket engines. The space power unit is connected to an existing turbine-generator, replacing the coal-fired boiler, and is designed to generate 11,000 KW of electricity (enough power to serve about 10,000 homes). The engine can virtually eliminate emissions of particulates and other pollutants without the noise normally associated with rocket engines. A project is underway to install the engine at Commonwealth Edison's generating station near Joliet, Illinois.

1971

51456

APTIC NO. 71591

French, C. C. J. and S. Norris-Jones

OPTIMISATION OF ENGINE PARAMETERS FOR OPERATION OF FOUR CYCLE DIESEL ENGINES AT HIGH RATINGS. *Congres International Des Machines A Combustion, Int. Congr. Combust. Engines, Proc. Conf., 9th, Stockholm, Sweden, 1971, p. 1-41. 2 refs.*

Performance and smoke emission measurements were made over a wide range of engine operating conditions on a single cylinder diesel engine equipped with direct fuel injection. Minimum smoke emissions corresponded to engine operation at optimum performance conditions, with retardation of injection timing causing increased smoke emissions. Although the smoke emissions were reduced at off-optimum conditions by applying additional boost, the resultant maximum cylinder pressures were generally higher than for optimum conditions and a normal degree of boost. The use of shallow bowl direction injection chamber enabled lower rates of injection to be employed than with a deep bowl, thus easing the fuel injection problems.

51457

APTIC NO. 73782

Jo, Y. and T. Ayusawa

METHODS OF EXHAUST GAS AND EMISSION CONTROL TREATMENT FOR VARIOUS INTERNAL COMBUSTION ENGINES. (*Kakushu nainen kikan no haiki gasu to mugaika shori no hoho*). Text in Japanese. *Nihon Jidosha Kenkyusho Hojo Jigyo Hokokusho* (Japan Aut. Res. Inst., Inc. Rept.), vol. 1971:7-20, June 1971.

Studies on exhaust gas components and exhaust purification systems are described. The JAPECS Project (Japan Automobile Research Institute Perfect Emission Control System Project) is a 5-year plan for development of a perfect emission control system. The first two years are for basic research, with emphasis on practical development slated thereafter. Four engines (three gasoline (4-cycle, water-cooled, 4-cylinder; 2-cycle, air-cooled, 2-cylinder; and rotary) and one diesel (4-cycle, prechamber, 4-cylinder)) were used to determine nature of exhaust components and their concentrations under laboratory conditions. Six JAPECS exhaust purification systems are described. Different engines may require different systems for maximum efficiency. Exhaust treatment simulations were derived for various conditions (constant driving; cold start, extreme conditions; chemical reactions). Three-dimensional models were derived: X-axis, engine rpm; Y-axis, boost; Z-axis, gas temperature, amount of supplementary hydrocarbons, or amounts of supplementary air. For 2000-cc, 4-cycle,

AIR POLLUTION ABSTRACTS, OCTOBER 1975

automotive gasoline engine, under constant conditions, calculated results indicated the following: heat formation in the nitric oxide reduction layer was small, and the temperature increase of exhaust gases is minimal. Heat formation from HC and carbon monoxide oxidation layer can become very high. Supplementary HC is necessary when air/fuel ratio is high, especially around 13.5, when NO formation increases rapidly. The amount of HC added was slight, i.e., 0.01 g/s (normal hexane). Supplementary air between 4-30% of amount of exhaust gas flow is necessary.

51458

APTIC NO. 72021

Taylor, D. H. C., M. Whattam, and M. S. Janota

COMPARISON OF SINGLE AND TWO-STAGE TURBOCHARGING ON A MEDIUM-SPEED FOUR-STROKE DIESEL ENGINE AT HIGH B.M.E.P.S. *Congres International Des Machines A Combustion, Int. Congr. Combust. Engines, Proc. Conf., 9th, Stockholm, Sweden, 1971, p. 1-46. 10 refs.*

The performance and economics of single and two-stage turbocharging on a six-cylinder diesel engine (203 mm bore) running at 1000 rpm were investigated. Loads up to 350 lb/sq in. and 450 lb/sq in. bmep (brake mean effective pressure) were obtained with the single and two-stage systems, respectively. Unacceptable smoke levels were observed with both systems at fuel line pressures of 13,000 lb/sq in. and at 350 lb/sq in. bmep. The single-stage turbocharging set-up showed greater smoke emissions which amounted to a Dunedin smoke number of 0.65. The use of an injector nozzle that gave good full and light load smoke resulted in fuel line pressures above the design limit of 16,000 lb/sq in. The problem of using a conventional jerk fuel injection system at very high outputs, while maintaining acceptable light load smoke conditions was not solved. Modification of the six-cylinder engine with a single-stage turbocharging system was estimated to increase the cost by some 4%, while the addition of a second turbocharger increased the cost a further 11%. The specific fuel consumption of the engine was only marginally affected by the two different turbocharging systems up to 350 lb/sq in.

51459

APTIC NO. 71521

Tyler, J. R. and R. C. Smith

THE DESIGN OF A 3000 HP INDUSTRIAL GAS TURBINE. *Congres International Des Machines A Combustion, Int. Congr. Combust. Engines, Proc. Conf., 9th, Stockholm, Sweden, 1971, p. 1-34. 2 refs.*

Design considerations for a 3000 horsepower industrial gas turbine are outlined. Construction requirements are discussed for the compressor, the compressor driving turbine, a high pressure shaft arrangement, the turbine casing, the combustion system, the turbine stator, the power turbine unit, and the operational control system. A fuel-injected, multiple-chamber combustion system which is capable of burning either distillate oil or fuel gas is described. The burning of natural gas results in less smoke emissions. The control system includes a means to detect engine exhaust temperature and flame failure. An electronic system is used for opening the blow-off valves on a speed plus acceleration signal during changing load conditions.

51460

APTIC NO. 71522

Vogts, Josef

GAS TURBINE FOR RAIL VEHICLES. *Congres International Des Machines A Combustion, Int. Congr. Combust. Engines, Proc. Conf., 9th, Stockholm, Sweden, 1971, p. 1-26.*

The advantages of gas turbine engines over diesel engines for powering rail vehicles are outlined in terms of operation, economy, and exhaust emissions. Carbon monoxide, nitrogen oxide, and hydrocarbon emission rates from a typical turbo train are 2.8-11.3, 2.3-8.9, and 0.0-0.96 g/train km, respectively, as compared to 25.4-115, 36.8-128, and 0.11.5 g/train km for diesel-powered trains. The continuous combustion of a gas

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turbine is also easier to control than the much faster combustion in a diesel engine. Procurement and operating costs of gas turbine trains are less than those for diesel trains, especially for high speed rail transport.

1970

51461

APTIC NO. 74268

Suelzer, Berchtold

STUDY INTO THE REACTION OF CALCIA WITH CARBON DIOXIDE AND SULFUR DIOXIDE UNDER NON-ISOTHERMAL CONDITIONS WITH RESPECT TO THE REMOVAL OF SULFUR DIOXIDE FROM FIRING EQUIPMENT-GENERATED FLUE GASES. (Untersuchungen zur Reaktion von CaO mit CO₂ und SO₂ unter nicht-isothermen Bedingungen im Hinblick auf eine Entfernung von SO₂ aus Feurungsabgasen). Text in German. Rheinisch-Westfaelische Technische Hochschule, Aachen (West Germany), Mathematisch-Naturwissenschaftliche Fakultät, Thesis (Ph.D.), July 13, 1970, 109p. 59 refs.

The reactions occurring between calcia and carbon dioxide and sulfur dioxide which occur in firing equipment-generated flue gases were studied with a view to flue gas desulfurization. Incomplete addition of CO₂ to calcia, and strong dependence of this reaction of the temperature curve were determined. The rate of reaction determined for a linear temperature increment from ambient temperature to the decomposition temperature was substantially higher than that determined for an opposite linear temperature reduction due to the formation, in the latter case, of a protective carbonate shell preventing the diffusion of CO₂. Several reaction products, such as calcium sulfite, calcium sulfate, and calcium sulfide occurred simultaneously in the reaction of SO₂ with calcia. The first addition reaction occurred between 200 and 400 C in the form of sulfite formation at a rate determined by physical parameters. Chemically controlled sulfite formation occurred above 500 C, accompanied by decomposition due to disproportionation into calcium sulfide and calcium sulfate in solid phase. The dissociation of the residual calcium sulfite above 700 C occurred only when the SO₂ partial pressure was low. Further additive reaction yielding calcium sulfate occurred above 750 C, which was followed by decomposition above 850 C. The reaction rate increased with decreasing calcination temperature and decreasing particle size. The reaction rates achieved at 0.5% SO₂ ranged from 8 to 25%. These low conversion rates occurring during flue gas desulfurization by blow-in of lime dust are due to the formation of a thick sulfate capsule around the calcia particles.

1968

51462

APTIC NO. 74230

Ramsdell, Roger G., Jr.

DESIGN CRITERIA FOR PRECIPITATORS FOR MODERN CENTRAL STATION POWER PLANTS. Preprint, 15p., 1968. 8 refs. (Presented at the American Power Conference, Annual Meeting, 33rd, Chicago, Ill., April 23-25, 1968.)

Design criteria for electrostatic precipitators serving electrical power plants are presented. Basic design factors which determine the collection efficiency of a precipitator are the collecting plate area, the velocity of the gas being treated, the time that the gases are in contact with the discharge wires and collecting plates, and the electrical system supplying the useful power to the flue gas. Precipitator design curves are illustrated for collection efficiency as a function of each of the above parameters. A method for quickly determining the probable collection efficiency of a precipitator is described that predicts efficiency simply as a function of the number of active bus sections into which the precipitator is divided, provided that each section is backed up by adequate transformer-rectifier

sets. The method is useful both for purchasing new dust collecting equipment and for re-evaluating existing equipment.

1953

51463

APTIC NO. 74273

Erickson, O. E.

DUST CONTROL OF ELECTRIC STEEL FOUNDRIES IN LOS ANGELES AREA. Proc. Electr. Furn. Steel Conf., vol. 11:157-163, 1953.

Experience with various methods for controlling dust emissions from electric steel foundries in the Los Angeles area is reviewed. Wet collectors are not capable of handling particles less than about 5 micron in size; and, since approximately 68% of the dust emissions from electric furnaces fall into this size range, such collectors are not effective. Baghouse collectors offer a very high collection efficiency, though the bags cannot be effectively shaken clean due to the high angle of repose associated with electric furnace dust. Satisfactory collection efficiency with electrostatic precipitators can be achieved only if the air stream is first cooled so that the dust particles are sufficiently ionized; problems connected with wet collection systems are simply added to the high costs of electrostatic precipitator installations. The most efficient system for the collection of electric furnace dust emissions appears to be a tube-type bag filter using Orlon bags in combination with adequate reverse air flow with mechanical shaking. Such units are completely automatic and require no operator. The collected dust can be removed from the filter while the unit is in operation. This type of dust collecting unit can be used for air temperature up to 250 F.

1941

51464

APTIC NO. 65101

Lepoivre, A., A. Pignot, A. Leroy, and A. Martin

GASOGENE FUELS; GASOGENES; MOTORS FED WITH GENERATOR GAS; FUEL COAL GAS; FUELS DERIVED FROM CALCIUM CARBIDE; LUBRICATING OILS. National School of Internal Combustion Engines, Conf. Mfr. Use Replacement Fuels Lubr., p. 1-162, 1941. Translated from French, 1968.

Presentations are given on the feasibility of manufacturing and using replacement fuels and lubricants for internal combustion engines, including those designed for vehicular use. Topics covered include: gasogene fuels derived from wood, charcoal torrefied wood or brown charcoal, mineral fuels (coal, cokes, and semicokes), and briquets; the components of gasogene installations including gas generators, coolers, purifiers, and air and gas mixing chambers; engines fed with producer gas; the use of fuel coal gas from gas plants and coking plants, the use of calcium carbide-produced acetylene to feed internal combustion engines; and various lubricating oil alternatives, including castor oil, olive oil, and graphited oils. The replacement fuels are considered in terms of their combustion efficiency, availability, feasibility for application, and possible safety hazards.

MEASUREMENT METHODS

1975

51465

APTIC NO. 74012

Abbey, O. B., D. W. Glover, and J. M. Thorp

A METHOD OF PLUME PHOTOGRAPHY. In: Pacific Northwest Laboratory Annual Report for 1974 to the USAEC Division of Biomedical and Environmental Research. Part 3: Atmospheric Sciences. Battelle Memorial

Inst., Richland, Wash., Pacific Northwest Labs., Rept. UC-11, p. 251-253, Feb. 1975. 2 refs.

NTIS: BNWL-1950 PT3

A transit-camera system which is capable of obtaining instantaneous or long exposure integrated plume photographs is described. A modified transit which permits the mounting of a 16 mm movie camera, a 35 mm single lens reflex camera, or a 4 by 5 press type camera above the transit barrel is used. The arrangement sites on reference objects and/or boundaries of the plume to an accuracy of 1/10 deg or less, with very small errors of parallax in the vertical and none in the horizontal. Long time exposures are possible with neutral density filters which can be used singly, in tandem, or in combination with colored Wratten type filters. The 35 mm or 4 by 5 camera produces instantaneous and time exposed integrated photographs of the plume, and the movie camera takes time lapse movies of the same plume at approximately one to two frames per min.

51466

APTIC NO. 75376

Beard, Michael E., Jack C. Suggs, and John H. Margeson

EVALUATION OF EFFECTS OF NO, CO₂, AND SAMPLING FLOW RATE ON ARSENITE PROCEDURE FOR MEASUREMENT OF NO₂ IN AMBIENT AIR (FINAL REPORT). Environmental Protection Agency, Research Triangle Park, N. C., Quality Assurance Monitoring Lab., Program Element 1HA327, ROAP 26AAG, Rept. EPA-650/4-75-019, 31p., April 1975. 13 refs.

NTIS: PB 242285/AS

The effects of sampling flow rate and interference from nitric oxide and carbon dioxide on the Sodium Arsenite Method for the colorimetric determination of nitrogen dioxide in ambient air were examined. Flow rates of 220-270 cu cm/min, a range considered adequate for ambient sampling, exerted no effect on the method's response; higher flow rates decreased the method's response. The method's response was linearly related to changes in NO₂ level. Changes in the levels of NO or CO₂ significantly changed the slope of this linear relationship. The method showed an average positive bias of 9.9 micrograms/cu m over NO₂ concentrations of 50-250 micrograms/cu m, NO concentrations of 50-310 micrograms/cu m, and CO₂ concentrations of 200-500 ppm. The 95% confidence interval for this bias was + 7.5-12.2 micrograms/cu m. An expression was derived for relating method response to NO, CO₂, and NO₂ concentration. (Author abstract modified)

51467

APTIC NO. 75148

Birks, L. S., M. Fatemi, J. V. Gilfrich, and E. T. Johnson

QUANTITATIVE ANALYSIS OF AIRBORNE ASBESTOS BY X-RAY DIFFRACTION: FINAL REPORT ON FEASIBILITY STUDY. Naval Research Lab., Washington, D. C., Environmental Protection Agency Interagency Agreement EPA-IAG-085(D), Program Element 1AA010, ROAP 16AAN, Rept. EPA-650/2-75-004, NRL-7874, 16p., Jan. 1975. 3 refs.

Special X-ray diffraction geometry is described along with a technique for aligning chrysotile fibers so that the latter can be distinguished from serpentine and other clay minerals in airborne asbestos samples. The method gives a limit of detection of 0.2 micrograms for 500 sec of counting time; the detection limit degrades to 0.4-0.5 micrograms for samples containing extraneous material. The number of samples which can be analyzed in an 8-hour day using the X-ray analysis depends primarily on the X-ray counting time.

51468

APTIC NO. 75125

Black, Francis M., Larry E. High, and John E. Sigsby

METHODOLOGY FOR ASSIGNMENT OF A HYDROCARBON PHOTOCHEMICAL REACTIVITY INDEX FOR EMISSIONS FROM MOBILE SOURCES. Environmental Protection Agency, Research Triangle Park, N. C., Chemistry and Physics Lab., Program Element

AIR POLLUTION ABSTRACTS, OCTOBER 1975

1AA010, ROAP 26ACV, Rept. EPA-650/2-75-025, 27p., March 1975. 9 refs.

NTIS: PB 240721/AS

An analytical scheme which permits the assessment of the photochemical significance of light-duty mobile source hydrocarbon emissions is described. The scheme incorporates both the mass and the atmospheric reactivity of the hydrocarbon emissions. A newly developed gas chromatographic procedure for the measurement of nonreactive hydrocarbons is combined with subtractive techniques to derive various classes of reactivity for hydrocarbons. The classes defined are: Class I, nonreactive hydrocarbons which include methane, ethane, acetylene, propane, and benzene; Class II, reactive hydrocarbons which include paraffins with four or more carbons; Class III, reactive hydrocarbons which include the aromatics except benzene; and Class IV, reactive hydrocarbons which include the olefins. Procedures for the assignment of a Hydrocarbon Photochemical Reactivity Index utilizing the reactivity definition in conjunction with the mass emissions are also presented. (Author abstract modified)

51469

APTIC NO. 75187

Brooks, E. F., E. C. Beder, C. A. Flegel, D. J. Luciani, and R. Williams

CONTINUOUS MEASUREMENT OF TOTAL GAS FLOWRATE FROM STATIONARY SOURCES (FINAL REPORT). TRW Systems Group, Redondo Beach, Calif., Environmental Protection Agency Contract 68-02-0636, Program Element 1AB013, ROAP 21ACX-AE, Rept. EPA-650/2-75-020, TRW 23060-6019-RU-00, 262p., Feb. 1975. 7 refs.

NTIS: PB 241 894/AS

Laboratory and field evaluations of hardware and techniques for the continuous measurement of the total gas flow rate from stationary sources were conducted, with particular emphasis being placed on large or complex ducts where total flow metering devices such as plate orifices are not practical. The total volumetric flow rate in either circular or rectangular ducts was measured with accuracies consistently better than 10% when from one to eight flow sensors were properly positioned; standard traversal techniques would require from 20-50 traverse points. Rectangular duct mapping techniques displayed optimum accuracy immediately downstream of an elbow. Several off-the-shelf velocity sensors were acceptable for use in the specified stack-type environment. (Author abstract modified)

51470

APTIC NO. 75154

Constant, Paul C., Jr., George Scheil, and Michael C. Sharp

COLLABORATIVE STUDY OF METHOD 10 - REFERENCE METHOD FOR DETERMINATION OF CARBON MONOXIDE EMISSIONS FROM STATIONARY SOURCES - REPORT OF TESTING. Midwest Research Inst., Kansas City, Mo., Environmental Protection Agency Contract 68-02-1098, Program Element 1HA327, ROAP 26AAG, Rept. EPA-650/4-75-001, 3814-C, 91p., Jan. 1975. 2 refs.

NTIS: PB 241 284/AS

A collaborative test of the Federal Reference Method 10 for the determination of carbon monoxide emissions from stationary sources was performed. The test comprised 16 1-hour runs at 500 ppm CO and 16 1-hour runs at 300 ppm CO; seven different collaborative organizations sampled simultaneously according to the integrated sampling procedure given in Method 10, with the sampling manifold being connected to the CO boiler stack of a fluid catalytic cracking unit at a petroleum refinery. Each collaborator also analyzed six cylinders of CO in nitrogen which were certified by the National Bureau of Standards. Method 10 as executed in the test produced results with only a moderate accuracy of + or - 87 ppm (2 standard deviations) on the average. The following inadequacies in the procedures as written in Method 10 were observed: the

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Ascarite weight gain method for measuring carbon dioxide content in the sample is subject to large error; the use of an impinger or bottle for the Ascarite trap causes great difficulties involving the formation of a solid plug in and around the glass inlet tube; most commercial nondispersive infrared instruments possess a significant amount of curvature in the calibration curves which is not adequately corrected for by many collaborators; and some calibration gas suppliers provide certificates of analysis that show errors of as much as 30%.

51471

APTIC NO. 75379

Constant, Paul C., Jr., Michael C. Sharp, and George W. Scheil

COLLABORATIVE TEST OF THE CONTINUOUS COLORIMETRIC METHOD FOR MEASUREMENT OF NITROGEN DIOXIDE IN AMBIENT AIR. *Midwest Research Inst., Kansas City, Mo., Environmental Protection Agency Contract 68-02-1363, Program Element 1HA327, ROAP 26AAF, Rept. EPA-650/4-75-011, 131p., Feb. 1975, 12 refs.*

Collaborative tests among 10 laboratories were performed to determine the precision and bias of the Continuous Colorimetric Procedure established as a tentative method for the determination of nitrogen dioxide in air. The relative measurement errors were stable over an NO₂ concentration range of 50-400 micrograms/cu m and were not very large (about 6% of the true value). The collaborator-collaborator relative standard error was also fairly stable but larger (12% and 13% of the true value). The bias was not stable with respect to NO₂ level, however. It was not consistent within collaborators. Although the overall average bias was only about + 10%, individual laboratories produced biases as great as + 80%. The lower detection limit within a given laboratory was less than or equal to 13 micrograms/cu m, and the lower detection limit from a set of collaborators was less than or equal to 19 micrograms/cu m. (Author summary modified)

51472

APTIC NO. 75377

Ellis, E. Carol and John H. Margeson

EVALUATION OF GAS PHASE TITRATION TECHNIQUE AS USED FOR CALIBRATION OF NITROGEN DIOXIDE CHEMILUMINESCENCE ANALYZERS (FINAL REPORT). *Environmental Protection Agency, Research Triangle Park, N. C., Quality Assurance and Environmental Monitoring Lab., Program Element 1HA327, ROAP 26AAF, Rept. EPA-650/4-75-021, 48p., April 1975, 10 refs.*

NTIS: PB 242294/AS

A gas phase titration technique for calibrating nitrogen dioxide chemiluminescence analyzers was evaluated. The calibration technique involves the gas phase titration of nitric oxide with ozone to produce NO₂ stoichiometrically. A ruggedness test of this procedure indicated that normal variations in reaction and mixing chamber volumes, ratio of dilution air flow to flow through the ozone generator, use of different ozone generators with different dilution air flows, and use of different standard NO levels exert little effect on the gas phase titration procedure. Close agreement between NO₂ analyzer responses to the same NO₂ concentrations generated by both gas phase titrations and gravimetrically calibrated permeation devices indicated that gas phase titration is also an accurate calibration procedure. (Author conclusions modified)

51473

APTIC NO. 74200

Hayashi, Hiroshi

AUTO EXHAUST GAS ANALYSIS. (*Jidosha haiki gasu no bunseki*). Text in Japanese. *Nainen kikan (Internal Combust. Engine)*, 14(2):111, 1975.

The legal standard methods of analysis of carbon monoxide, hydrocarbon, and nitrogen oxides in auto exhaust gas are reviewed. Presently, non-dispersive infrared analysis is adopted for CO, flame ionization detection for HC, and

chemiluminescent detection for NO_x. The functional principle of each method and interference effects between the detecting gas and mixture gases are discussed. The filter paper colorimetric method photo-transmission method, and mass emission method are compared with respect to sampling and analysis. Smoke-meters are also discussed.

51474

APTIC NO. 74075

Hayashi, T.

MEASURING METHOD OF ATMOSPHERIC HYDROCARBON BY GAS CHROMATOGRAPHY.

(*Gasu kuromatogurafu ni yoru taiki chu no haidoro kabon no sokutei hoho ni tsuite*). Text in Japanese. *Chugoku Denryoku Gijutsu Kenkyujo Giken Jiho Chugoku Elec. Power Co., Tech. Res. Inst., Current Res. Rep.*, no. 47:153-158, March 1975, 6 refs.

Analyses of n-pentane, n-hexane, benzene, and toluene were carried out by using a 3 mm by 7 m column packed with Apiezon grease (25%) on Chromosorb (60/80 mesh) and a flame ionization detector. The optimum condition was obtained by etching of column material at 260 C for 50 hrs; cooling of the column to room temperature; increasing of column temperature at 4 C/min; and varying air, hydrogen, and carrier gas (helium) flow speeds. The optimum conditions were air flow speed, 1000 ml/min; H₂ flow speed, 15 ml/min; He flow speed, 12.5 ml/min; and detector temperature, 300 C. The retention times of the sample gases from air were compared to those of standard gas samples. The collection efficiency by a concentrating technique was between 95.25% to 98.68%.

51475

APTIC NO. 73812

Imamura, Kiyoshi and Toru Fuji

STUDIES ON HYDROCARBONS IN THE ATMOSPHERE, PART 5, QUANTITATIVE ANALYSIS OF BENZENE BY GC-MS. (*Taiki chu no tanka suiso no kansuru kenkyu, 5, GC-MS ni yoru benzen no teiryu*). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 731, 1975. (Presented at the Japan Chemical Society Spring Term Annual Meeting, 32nd, Tokyo, Japan, April 1-4, 1975, Paper 3N40.)

By using the m/e 78 on mass spectra, benzene in an air sample was quantized after gas chromatographic separation. The GC column used was 10% Apiezon L on Chromosorb W (60-80) and the column temperature was 70 C. The retention time of benzene under this GC condition was 3.3 min. The benzene calibration curve was prepared using reagent grade benzene in ethanol solution and the peak height at m/e 78 was taken, which gave a linear curve with a standard error within 2 to 3%. The detection limit was 0.01 ng which is equivalent to 9.6 ppb when 0.1 ng benzene is present in 3 ml gas. Room air was collected into a 3 ml teflon sampling tube and analyzed by GC-MS. The benzene in the sample was 33.0 ppb. The GC-MS technique for benzene analyses is rapid (5 min/sample), has good precision, and can analyze ppb levels of benzene in air samples.

51476

APTIC NO. 73783

Katayama, Yukio, Norio Ishida, Hideki Motoki, and Hiroyuki Nakahara

ENVIRONMENTAL POLLUTION FROM ANTIMONY SMELTING PLANT, PART 2, ANALYTICAL METHODS FOR ANTIMONY DETERMINATION IN SOIL. (*Anchimon seiren kojo ni yoru kankyo osen, dai 2-ho, dojochu no anchimon no bunseki hoho ni tsuite*). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 819, 1975. (Presented at the Japan Chemical Society Spring Term Annual Meeting, 32nd, Tokyo, Japan, April 1-4, 1975, Paper 2033.)

Analytical methods for determining antimony in soil were studied. The methods considered were atomic absorption spectrometry, neutron activation analysis, and colorimetry using Rhodamine B or silver diethyldithiocarbamate. For atomic ab-

sorption spectrometry, soil collected near an antimony smelting plant was extracted by hydrochloric acid solutions in different concentrations: concentrated-hot 6 N, 0.2 N, and 0.1 N. Neither 0.2 N nor 0.1 N HCl solutions could extract antimony from soil samples. The concentrated-hot HCl extracted more antimony than the 6N HCl solution, and the analytical results by the former and latter HCl solutions were 152.5 ppm and 127.4 ppm respectively for the same soil sample. Neutron activation analysis gave higher values than the atomic absorption technique for the same sample, and soil sample levels less than 10 ppm Sb by neutron activation could not be detected by atomic absorption spectroscopy. The Sb values found at different depths from the ground surface by neutron activation were 187.2 ppm for surface soil, 170.8 ppm for soil at 2 to 5 cm depth, and 105.8 ppm for soil at 5 to 10 cm, while the atomic absorption values for the same soil samples were 82.4 ppm, 56.7 ppm, and 32.9 ppm respectively.

51477

APTIC NO. 72329

Kato, Nobuyuki

CONTINUOUS DETERMINATION OF OXIDANT.

(*Okishidanto no renzoku sokutei*). Text in Japanese. Sangyo Kogai (Ind. Public Nuisance), 11(2):130-134, 1975.

Continuous oxidant determination methods are summarized. Four methods are applicable for ozone determination: potassium iodide absorption, coulometry, chemiluminescence, and ultraviolet absorption. The first two are also applicable to any oxidants, although sulfur dioxide, hydrogen sulfide or other reducing compounds interfere with the oxidant determination. They can be removed by using a scrubber such as chromium trioxide. These two methods use neutral KI solution (2 to 10% water) and iodine is liberated upon the reaction with oxidants. The amount of liberated iodine is determined by coulometry (measuring the electric current in the electrolytic cell) or colorimetry (at 365 nm). The chemiluminescence method for ozone uses the reaction with ethylene gas and an excited state formaldehyde is produced. The excited state formaldehyde emits at 300 to 600 nm (maximum at 430 nm). The UV absorption at 250 to 260 nm can be used for the O₃ determination. Because of the large absorption coefficient of O₃ at these wavelengths, only mercury vapor and high concentrations of benzene interfere. However, this is not likely to be observed in atmospheric O₃ determinations because of the actual levels of these substances in the air.

51478

APTIC NO. 73883

Kimoto, Toshio

INSTRUMENTAL ANALYSES OF HYDROCARBONS.

(*Tanka suiso no kiki sokutei*). Text in Japanese. Sangyo Kogai (Ind. Public Nuisance), 11(2):115, 1975. 41 refs.

Instrumental analyses for hydrocarbons are reviewed. The use of flame ionization detector (FID) is effective for most hydrocarbons, however the electron capture detector (ECD) must be used for aldehydes, peroxyacetyl nitrate, and others for which FID is not sensitive. Gas chromatography equipped with a highly sensitive detector such as FID and ECD is suitable for analysis of individual hydrocarbons. If mass spectrometry is combined with GC, hydrocarbon analyses improve greatly. A simple and rapid analytical technique is non-dispersive infrared analysis, but interference by carbon monoxide, carbon dioxide, and water is expected and the technique cannot be used in general for individual hydrocarbon analyses. Flame ionization analysis is a rapid and simple method to determine methane, non-methane hydrocarbons, and carbon monoxide; however, the FID response varies with the type of hydrocarbons and for CO to be analyzed by FID it must be reduced to methane by a metal catalyst such as nickel. The photoionization analyzer and simple GC with cartridge type GC column are useful for monitoring hygienic conditions at factory working rooms in which use of hydrogen gas for FID is often dangerous. Thin layer chromatography, fluorescence, absorption, and high speed liquid chromatography can also be used for some hydrocarbon analyses.

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APTIC NO. 73981

Laulainen, N. S.

BELOW CLOUD SCAVENGING OF AEROSOLS: SOME IDEALS FOR IMPROVED MEASUREMENTS.

In: *Pacific Northwest Laboratory Annual Report for 1974 to the USAEC Division of Biomedical and Environmental Research. Part 3: Atmospheric Sciences. Battelle Memorial Inst., Richland, Wash., Pacific Northwest Labs., Rept. UC-11, p. 109-113, Feb. 1975. 6 refs.*

NTIS: BNWL-1950 PT3

Suggestions for improving measurements of below-cloud aerosol scavenging are presented. The careful characterization of primary and secondary aerosols by direct technique is of the utmost importance. A direct measurement technique is one where actual physical samples, e.g., filter paper samples, are analyzed according to size or any other physical characteristic with a direct measurement instrument. Good humidity control in the sampling system is also crucial because of the importance of particle growth by water condensation. Ideally, the sampler perturbs the environmental conditions only minimally; the Goetz and Stoeber aerosol spectrometers appear better suited to these requirements than cascade impactors.

51480

APTIC NO. 74015

Laulainen, N. S.

STABILITY TESTS OF SEVERAL DIFFERENT SUNPHOTOMETERS.

In: *Pacific Northwest Laboratory Annual Report for 1974 to the USAEC Division of Biomedical and Environmental Research. Part 3: Atmospheric Sciences. Battelle Memorial Inst., Richland, Wash., Pacific Northwest Labs., Rept. UC-11, p. 264-268, Feb. 1975. 3 refs.*

NTIS: BNWL-1950 PT3

Stability tests of two different sunphotometers were performed. One instrument was a Climet Volz-type sunphotometer with a single broad band filter (Wratten 65) centered at 500 nm wavelength, while the other was a six-color sunphotometer with a 500 nm filter as well as a narrow band interference filter centered at 500.7 nm. The sensing unit for the Climet was a selenium photovoltaic cell; the six-color photometer used a vacuum photodiode. The wavelength cutoff for both photosensors was around 650 nm. An apparent zero-point drift was noted for both instruments, with variable temperature and atmospheric turbidity being identified as potential drift sources. Further testing is required to unambiguously determine the uncertainties in instrument calibration. (Author abstract modified)

51481

APTIC NO. 73970

Lee, R. N., M. M. Orgill, L. L. Wendell, and P. W. Nickola

TRANSPORT AND DIFFUSION MEASUREMENTS WITH AN AIRBORNE GAS CHROMATOGRAPH.

In: *Pacific Northwest Laboratory Annual Report for 1974 to the USAEC Division of Biomedical and Environmental Research. Part 3: Atmospheric Sciences. Battelle Memorial Inst., Richland, Wash., Pacific Northwest Labs., Rept. UC-11, p. 46-50, Feb. 1975. 4 refs.*

NTIS: BNWL-1950 PT3

A real-time gas chromatographic sulfur hexafluoride tracer detection system for airborne transport and diffusion measurements is described. The operation of the system is based on frontal elution chromatography. Sensitivity of the electron capture detector oxygen limits the sampling time to 10-15% of the flight time and necessitates a periodic backflush to purge oxygen from the system. The utility of the system is confirmed by 12 experimental flights involving the release of the tracer from the top of a meteorological tower. Although the observed SF₆ plume segment paths are nearly identical to constant volume balloon trajectories, this method of plume tracking is not totally satisfactory since the need to maintain visual contact with the balloon prevents adequate vertical and lateral

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sampling. A second disadvantage of the technique is the distance over which SF₆ may be followed; the maximum distance thus far achieved is about 65 km, although this does not represent the limiting range of the system. The aircraft ground speed (63 m/sec) and the restricted sampling time (50 sec) place a limit of approximately 3 km on the width of the sampling window.

51482

APTIC NO. 74282

Markowski, Gregory R.

A USEFUL METHOD FOR TRANSIENT RESPONSE ANALYSIS AND DATA CORRECTION APPLIED TO AIRCRAFT PLUME SAMPLING. Preprint, Air Pollution Control Assoc., Pittsburgh, Pa. 14 p., 1975. 5 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-40.3.)

Many instruments used in aircraft plume monitoring do not respond rapidly enough to short pulses of pollutants to accurately measure their concentrations near the source. The effective time response of these instruments can be significantly improved by correcting the raw data using a judicious mathematical model of their transient response. The model describing the transient response of the instruments discussed in this paper was assumed to be $C_t - C_i$ equals $\alpha_1 C_i$ prime + $\alpha_2 C_i$ double prime, where C_t is the true concentration, C_i is the indicated concentration, and C_i prime and C_i double prime are the first and second time derivatives of the indicated concentration, respectively. Provision is made to offset the true and indicated concentrations by the system dead time. The derivative constants, α_1 and α_2 , characterize the transient response and were determined experimentally. The modelling approach to transient response is useful and powerful, and the second-order model fits well with the response of the electrochemical and chemiluminescent systems tested. (Author abstract modified)

51483

APTIC NO. 75124

Medeck, Hector, Myron Kaufman, and Daniel F. Magnus

DESIGN, DEVELOPMENT, AND FIELD TEST OF A DROPLET MEASURING DEVICE (FINAL REPORT). KLD Associates, Inc., Huntington, N. Y., Environmental Protection Agency Contract 68-02-1309, Program Element 1AB012, ROAP 21ADJ-081, Rept. EPA-650/2-75-018, 56p., Feb. 1975. 18 refs.

The design, construction, and field testing of a device for measuring liquid droplets in the size range of 1-600 micron are described. The measurement probe consists of a platinum wire with a diameter of 5 micron. The probe is electrically heated to a predetermined temperature, and changes in the probe resistance are then related to the size of the impinging droplets in the gas flow. The electrical signals from the probe are processed and used to classify the droplets into six different size ranges. Actual droplet distributions and concentrations were successfully measured during field tests with two prototype systems. (Author abstract modified)

51484

APTIC NO. 73906

Munemori, Makoto, Yasuaki Maeda, and Ryohei Tsuruma

ORGANIC NITRITE AND NITRATE INTERFERENCE WITH THE NITROGEN DIOXIDE MEASUREMENT BY THE CHEMILUMINESCENCE METHOD. (Kagaku hakko ni yoru nisanka chisso sokutei ni taisuru yuki ashoan en oyobi shosan en no kansho). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 788, 1975. (Presented at the Japan Chemical Society Spring Term Annual Meeting, 32nd, Tokyo, Japan, April 1-4, 1975, Paper 1042.)

The efficiency of catalysts for the conversion of nitrogen dioxide to nitric oxide are determined and the conversion of isoamyl nitrite and isoamyl nitrate to NO by the same catalysts are also studied for the interference effects in

nitrogen oxides determination by chemiluminescence technique. The chloride compounds of copper, molybdenum, ruthenium, and platinum dissolved in water were loaded in a hollow carbon rod, allowed to dry at 550 C, and were then reduced under hydrogen gas for 5 hr and used as catalyst for the reaction. A 100% conversion of NO₂ to NO was achieved by these catalysts when 8.3 ppm NO₂ gas was heated at 400 C. The carbon by itself acted as the catalyst and also gave 100% conversion at this temperature. Of all the catalysts tested, the activity of copper was the highest for the conversion. A 100% conversion of isoamyl nitrate was also obtained with C, Ru, Mo, and Cu catalysts at 400 C. For isoamyl nitrite, the conversion at 400 C was 20%, 70%, and 80% for Ru and C, Mo, and Cu catalysts respectively. To eliminate the effect of isoamyl nitrite on NO₂ determination by chemiluminescence, the carbon catalyst can be used at 300 to 400 C heating condition which does not give much conversion of isoamyl nitrite to NO but gives 100% conversion of NO₂ to NO. However, the interference accompanied by isoamyl nitrate cannot be eliminated with these catalysts, and an alternative NO₂ determination must be made by the Saltzman method in which interferences by nitrate salts are small.

51485

APTIC NO. 73820

Nakada, Masaru, Hideki Mizumachi, and Takaaki Hada

LINEARIZER FOR SULFUR MONITORING SYSTEMS. (Sarufa monita, FPD ho, no riniyaraiza ni tsuite). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 775, 1975. (Presented at the Japan Chemical Society Spring Term Annual Meeting, 32nd, Tokyo, Japan, April 1-4, 1975, Paper 1027.)

The response of FPD (flame photometric detector) type sulfur monitors is non-linear with the sulfur concentration and is proportional to the sulfur concentration raised to a constant value n (depending upon the particular compounds). Therefore, the use of a linearizer is necessary to record signals for more comprehensive interpretation of data. Since the flame background and noise that accompany an electrometer respond linearly, their signals are very large compared to signals from sulfur compounds in a lower sulfur concentration region if the linearizer alone is used. To improve this it is necessary to offset the noise and background signal amplification made by the linearizer. The best offsetting input value to the system can be determined by the relation between the values n and tolerable error.

51486

APTIC NO. 72399

Neustadter, H. E., S. M. Sidik, R. B. King, J. S. Fordyce, and J. C. Burr

THE USE OF WHATMAN-41 FILTERS FOR HIGH VOLUME AIR SAMPLING. Atmos. Environ., 9(1):101-109, Jan. 1975. 22 refs.

Paired measurements of suspended particulates with glass fiber filters and Whatman-41 filters were taken at 16 sites over a high-volume air sampling network during a 13-month period to determine the feasibility of replacing glass fiber filters with the Whatman filters. The suspended particulate samples from the glass fiber filters averaged slightly, but not significantly, higher than those from the Whatman-41 filters. Extra handling procedures were required to avoid errors due to the hygroscopic nature of the Whatman-41 filters which demonstrated their practicability for air quality monitoring and elemental analysis in urban environments similar to the test site in Cleveland, Ohio. (Author abstract modified)

51487

APTIC NO. 71749

Ogden, T. L. and J. D. Wood

EFFECTS OF WIND ON THE DUST AND BENZENE-SOLUBLE MATTER CAPTURED BY A SMALL SAMPLER. Ann. Occupational Hyg., 17(3-4):187-195, 1975. 8 refs.

The effects of wind on the sampling of dust and benzene-soluble matter with a filter-holder dust sampler used for dust measurements at coke ovens were investigated in wind tunnel experiments with test aerosols. The collection efficiency of a sampler facing the wind initially increased with particle size to above 100% and then decreased for particle sizes over 15 micron. Efficiencies rapidly fell with increasing particle size when the holder was facing away from the wind flow. Dust measurements made on a coke over with one sampler facing a 2.6 m/sec wind and another sampler facing away from the wind indicated a ratio between the two concentrations obtained of about 4 (total dust). However, the ratio between benzene-soluble matter measurements was only about 1.5, indicating that such matter is concentrated on smaller particles. (Author abstract modified)

51488

APTIC NO. 73866

Petersen, M. R. and N. A. Wogman

SAMPLING AND ANALYSIS OF ATMOSPHERIC GASES. In: *Pacific Northwest Laboratory Annual Report for 1974 to the USAEC Division of Biomedical and Environmental Research. Part 4: Physical and Analytical Sciences. Battelle Memorial Inst., Richland, Wash., Pacific Northwest Labs., UC-48, p. 27-28, Feb. 1975.*

NTIS: BNWL-1950 PT4

A method for the collection and analysis of Freon 11, Freon 12, and carbon monoxide in the atmosphere downwind from metropolitan areas is described. These inert tracers, all of which are emitted due to man's activities, allow for the study of air mass movement and the prediction of the transport deposition of air pollutants. The air sampler consists of a lucite tube and plunger connected to a direct-current motor. The motor is geared so that the plunger can be withdrawn over 1-2-hour periods filling the 500-milliliter tube with a time-integrated air sample. The Freons are analyzed with a gas chromatograph fitted with an electron capture detector, and carbon monoxide analysis is performed with a continuous nondispersive infrared analyzer with special compensation for interference from water vapor.

51489

APTIC NO. 73969

Ramsdell, J. V. and P. Michael

A SYSTEMATIC ERROR IN THE MEASUREMENT OF PLUME CROSSWIND CONCENTRATION DISTRIBUTIONS WITH MOVING SAMPLERS. In: *Pacific Northwest Laboratory Annual Report for 1974 to the USAEC Division of Biomedical and Environmental Research. Part 3: Atmospheric Sciences. Battelle Memorial Inst., Richland, Wash., Pacific Northwest Labs., Rept. UC-11, p. 42-45, Feb. 1975. 5 refs.*

NTIS: BNWL-1950 PT3

A systematic error in measuring the variance of the crosswind concentration distribution of real plumes with mobile samplers is mathematically examined. The error arises when the movement of the plume during a sampler traverse is neglected. The error may result in either over- or underestimates of the true concentration variance on an individual traverse. However, when a number of traverses are made, there is a systematic overestimate of variance, the magnitude of which is a function of the relative velocities of the plume and sampler. (Author abstract modified)

51490

APTIC NO. 75230

Roberds, D. W., W. M. Farmer, and A. E. Lennett

INTERFEROMETRIC INSTRUMENTATION FOR PARTICLE SIZE ANALYSIS (FINAL REPORT). *Air Force Systems Command, Arnold Air Force Station, Tenn., Arnold Engineering Development Center and ARO, Inc., Environmental Protection Agency Contract EPA-1AG-0177(D), Program Element 65802F, ARO Proj. BF365, Rept. AEDC-TR-74-82, ARO-OMD-TR-74-41, 57p., Feb. 1975. 17 refs.*

Studies designed to determine the characteristics and potential capabilities of laser interferometer techniques for particle size analysis are reported. Particle sizes ranging from submicron to 1 mm can be determined by this technique when the cross-sectional shape of the particle is known. The theoretical lower limit in particle size measurement is about 0.05 wavelengths of the illuminating laser line, and the upper size limit is dictated by practical limitations such as beam splitting techniques. Number density can also be determined from the interferometric measurements in certain restricted applications. Fringe visibility techniques appear capable of being incorporated into a viable instrument for the real-time analysis of particle size simultaneously with velocity measurements.

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APTIC NO. 74110

Sakai, Kaoru

THE FIRST SURVEY REPORT BY THE INVESTIGATION COMMITTEE FOR SOX, NOX MEASUREMENT (PART 2). (*SOx, NOx keisoku chosa bunkakai, dai-ichi-ji chosa hokokusho* (2)). Text in Japanese. *Netsu Kanri To Kogai (Heat Management Public Nuisance)*, 27(3):85-88, 1975. 6 refs.

The types of automatic instrumentation in use in the United States for determining amounts of sulfur oxides at their source are surveyed. Results of instrument field tests, conducted by the Lawrence Berkeley Research Labs. at the behest of the U. S. government, are included. Japanese analyzers initially remove water and SO₃ by electronic cooling, but American makers manufacture simplified models which ignore this procedure. The American field tests did not specify any details on testing initial removal of water and SO₃. The instruments surveyed in this report use the following techniques: solvent electrical conductivity (Waesthoff, West Germany, through Calibrated Instruments); non-dispersive infrared absorption (Beckman Instruments; Bendix; et al); ultraviolet absorption with filter (DuPont; Intertech; et al); ultraviolet or infrared absorption with diffraction grating (Barringer Research; CEA Instruments; et al); flame photometric detection (FPD) (Melo Laboratories; et al); electric charge determination (Philips; Barton ITT); static potential electrolysis (polarographic method) (Dynasciences; EnviroMetrics; Theta Sensors); ion selection electrode (Geomet; Orion Research); chemically impregnated paper tape (Houston Atlas); ultraviolet fluorescence excitation (REM Scientific; et al); direct measurement by ultraviolet absorption analysis (Environmental Data); and the Hadamard transformation system IR analyzer (Spectra Imaging). Some schematic diagrams of instruments are included.

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APTIC NO. 73803

Sasaki, Kunihiro

AIR POLLUTION ANALYSIS BY CORRELATION SPECTROMETER. (*Sokan supekutoro meta ni yoru taiki osen ni sokutei hoho ni tsuite*). Text in Japanese. *Kankyo Gijutsu (Environ. Conserv. Eng.)*, 4(2):113, 1975.

The applicability of a correlation spectrometer for sulfur dioxide and nitrogen dioxide remote sensing was studied. The wavelengths selected were 310 nm for SO₂ and 410 nm for NO₂. The spectrometer was loaded on an automobile so that a continuous real-time analysis was possible at several locations. Two areal measurements for SO₂ and NO₂ were made in Hiroshima Prefecture using the mobile unit and the results were obtained as pollutant distribution maps for the area through which the mobile unit was driven. Since the technique could determine the mass transporting amounts of pollutants by changing the location of determination, the effect of wind direction on pollutant diffusion was clearly seen. The technique is limited to use an area which the mobile unit can be driven through. However, the limitation can be eliminated if the correlation spectrometer is loaded on an airplane. Since the sunlight scattered by pollutants was utilized for the measurement, the technique is limited to use during day time. This limitation can also be eliminated if an artificial light source is used, which would allow the measurement of pollutants during night time or in tunnels.

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APTIC NO. 74000

Sehmel, G. A. and F. D. Lloyd

EXPERIMENTAL DESIGN FOR DETERMINING TRACE RESUSPENSION RATES AS A FUNCTION OF WIND SPEED AND ATMOSPHERIC STABILITY. In: *Pacific Northwest Laboratory Annual Report for 1974 to the USAEC Division of Biomedical and Environmental Research. Part 3: Atmospheric Sciences. Battelle Memorial Inst., Richland, Wash., Pacific Northwest Labs., Rept. UC-11, p. 207-208, Feb. 1975. 2 refs.*

NTIS: BNWL-1950 PT3

The design of a field resuspension experiment to measure tracer particle resuspension rate as a function of wind speed and atmospheric stability is described. The design consists of an annular tracer source area and air sampling towers located in and downwind of the source. The annular area radii are 15 and 45 m, located around a central air sampling tower 37 m in height. The annulus extends from 188-330 deg. There are two sets of sampling towers radiating out from the central tower. Towers from one set are located on 200, 225, and 250 deg radial lines from the central tower to determine resuspension rates for high wind speeds, while the other set of towers are located on 275, 300, and 325 deg radial lines to determine resuspension rates for lower speeds of prevailing winds. There are four air sampling towers for each wind direction. Tracer resuspension rate reproducibility between cross wind sites is determined by three 9-meter towers located 7.5 m from the tracer edge, and four air sampling towers along both 225 and 300 deg are designed to determine tracer resuspension rate changes with distance in the respective wind direction.

51494

APTIC NO. 74071

Shirakawa, Keiyo and Hideo Inoue

A COLLECTOR FOR POLLUTANTS IN THE AIR. (*Kokichi no osen busshitsu hoshu sochi*). Text in Japanese. (Tokyo Precision Instrument Co., Ltd., Tokyo (Japan)) *Japan. Model Util. Sho 50-5430. 3p., Feb. 14, 1975. 1 ref. (Appl. Dec. 12, 1968, 1 claim).*

A collecting device for dusts, soots, radioactive substances, and other special pollutants during air pollution measurement is described. The device consists of a collecting head and a flow meter, both mounted on a supporting frame. The collecting head which has a funnel-type suction inlet, a filter paper and a net to support the filter paper, is screwed to a valve case which is connected to the inlet tube of the flow meter by a hose. The valve case has a foldable valve in the axial direction and a spring which drives the foldable valve. Air is sampled by adjusting the manual adjusting valve of the flow meter, and dusts in a constant volume of air are collected on the filter paper.

51495

APTIC NO. 75118

Smith, Wallace B., Kenneth M. Cushing, and George E. Lacey
ANDERSEN FILTER SUBSTRATE WEIGHT LOSS (SPECIAL REPORT). *Southern Research Inst., Birmingham, Ala., Environmental Protection Agency Contract 68-02-0273, Program Element 1AB012, ROAP 21ADM-011, Rept. EPA-650/2-75-022, SORI-EAS-74-392, 30p., Feb. 1975.*

The extent and cause of weight losses on Andersen impactor fiberglass substrates were investigated under laboratory conditions. Sample acquisition, if performed carefully, resulted in a weight loss of no more than 0.20 mg/stage. Although such a loss is not of major consequence when more than 2-3 mg of sample is collected, it does represent a serious error at lesser sample amounts. Incomplete drying and careless handling were the major sources of weight loss. (Author abstract modified)

51496

APTIC NO. 74153

Stebliy, N. I., M. K. Levina, and T. A. Katkova

JOINT DETERMINATION OF SULFUR DIOXIDE AND SULFUR TRIOXIDE. (*Metodika sovmestnogo opredeleniya sernistogo i sernogo angidridov*). Text in Russian. *Koks i Khim., no. 3:42-43, 1975. 3 refs.*

A method for the separate determination of sulfur dioxide and sulfur trioxide in their mixtures, as occur in cokeries in connection with the conversion of hydrogen sulfide into SO₂ and SO₃, is described. The gas to be analyzed is adsorbed in water in the presence of starch and iodine. The sulfuric acid formed in the adsorbent solution as a result of the dissolution of SO₃ and of the oxidation of SO₂ is determined by titration with sodium hydroxide in the presence of methyl red. The SO₂ concentration is determined from the quantity of iodine used up for the oxidation of SO₂.

51497

APTIC NO. 74014

Stokes, R. A. and A. J. Alkezweeny

ASSESSMENT OF CLIMATIC CONSEQUENCES OF POWER PRODUCTION POLLUTION. In: *Pacific Northwest Laboratory Annual Report for 1974 to the USAEC Division of Biomedical and Environmental Research. Part 3: Atmospheric Sciences. Battelle Memorial Inst., Richland, Wash., Pacific Northwest Labs., Rept. UC-11, p. 257-263, Feb. 1975. 16 refs.*

NTIS: BNWL-1950 PT3

A polarimeter attached to the Cassegrain focus of a 31-inch reflecting telescope was used to make in situ measurements of the complex index of refraction of atmospheric aerosols on three nights in May and June during different weather conditions. Comparisons of the polarimeter data with data obtained from direct aircraft sampling of the aerosol indicated that the Rayleigh-scattered light component can be reliably subtracted, with the remaining polarized intensity being directly related to the properties of the aerosol particles. An extension of the range of meteorological conditions during the measurements is necessary to develop a technique with the widest applicability. (Author abstract modified)

51498

APTIC NO. 73821

Watanabe, Atsuo

CONTINUOUS DETERMINATION OF CARBON MONOXIDE. (*Issanka tanso renzoku sokutei*). Text in Japanese. *Sangyo Kogai (Ind. Public Nuisance), 11(2):125-129, 1975.*

The non-dispersive infrared absorption technique as a continuous analysis for environmental carbon monoxide requires the removal of moisture from sample gases by a cooling dehumidifier or a drier such as a perma-pure drier which uses a permeation tube to remove moisture selectively. The dehumidifier sample gas enters into the non-dispersive IR CO analyzer. The analyzer has two different optical paths; a sample path and a reference path. Each optical path has a cell which contains sample gas and a reference gas such as nitrogen. An IR light source passed through the cell enters a detection cell filled with CO gas. The detection cell consists of two separate cell compartments which are connected through a tube enclosing a detector element. The sample and reference beams fall onto each side of a detection cell compartment warming up the CO gas enclosed and therefore the CO gas flows through the detector element depending on the light strengths of the reference and sample beams. This CO gas flow in the detection cell is measured as a function of temperature at the detector element. No monochromator is involved and interference arises from the compounds which absorb at the 4.6 micron CO absorption band.

51499

APTIC NO. 72094

Wolf, Philip C.

CONTINUOUS ACROSS-THE-STACK MEASUREMENT. *Environ. Sci. Technol., 9(3):221-225, March 1975. 4 refs.*

51500

Continuous in-stack measurement of particulate matter with optical transmissometers is reviewed. Such devices are used to measure the opacity of stack plumes or particulate mass emission. A Durag-Intertech transmissometer which contains a transmitter-receiver housing and a reflector housing is described in particular. Both housings are mounted on flanges of pipes fastened on a common axis in the stack or duct. Light from an incandescent light source is limited by an entrance aperture and passes through a light filter to produce quasi-monochromatic light. The peak of the transmitted spectrum is at about 5000 Å, with 85% of the light energy transmitted being at this wavelength. A chopper disc with holes and plane mirrors is located at the focal point of the condenser lenses for splitting the light beam into a measuring light beam and a reference light beam. Thus, the reference is established as a standard for continuous comparison with the attenuated value of energy. A typical output trace is illustrated for a transmissometer system that was mounted in the rectangular duct between an electrostatic precipitator and the induction fans of a municipal incinerator.

51500

APTIC NO. 74201

Yamashita, N.

INSTRUMENT FOR AIR POLLUTION MEASUREMENT.

(Taiki Osen Sokuteiki). Text in Japanese. Otomeshon (Automation), 20(1):47, Jan. 1975.

Commercial instruments for measurement of the density of sulfur dioxide and oxidant in the atmosphere are introduced as an example of the use of electronic technology for data analysis. Because of the recent progress in IC, FET, and MOS transistor solid state electronics devices, instruments of chemical analysis have become more compact and convenient. Furthermore the reliability has been greatly improved. The DKK (Denki Kagaku Keiki Co)-model GRH-2 is designed for the detection of SO₂ and the range of this detector is 0-0.05 ppm. It is designed to provide an average value of the density of SO₂ every hour. The DKK-Model GX-6 is a detector of oxidant in the range of 0-0.5 ppm and also provides an average value every hour.

51501

APTIC NO. 74092

Air Pollution Research Committee and SO_x, NO_x Instrumentation Survey Subcommittee (Japan)

THE FIRST SURVEY REPORT BY THE SO_x, NO_x INSTRUMENTATION SURVEY SUBCOMMITTEE. (SO_x, NO_x keisoku chosa bunkakai dai ichiji chosa hokokusho).

Text in Japanese. Netsu Kanri to Kogi (Heat Management Public Nuisance), 27(2):107-114, Feb. 1975.

As a part of survey study on the standardization of air pollution monitoring instruments, basic data on sulfur dioxide analyzers by infrared absorption, conductometry, flame photometry, ultraviolet absorption, coulometry, electrolysis, and gas chromatography were compiled for the standardization of measurement method, measurement condition, performance, structure, measurement procedure, and calibration method. The proposed Japanese Industrial Standard for continuous analyzers for sulfur oxides in flue gas (JIS B 7981 1975) is described with measurement principles (conductometry, infrared absorption, ultraviolet absorption, and flame photometry) and performance specifications (measurement range, reproducibility, indicator drifting, zero drift, span drift, indicator error, response time, warming-up time, effect of interfering component, thermal stability, stability against variation in sample gas flow rate, stability against variation in power source voltage, output power, and insulation resistance). The description of each analyzer is given with schematic diagrams, operational procedures, maintenance procedures, and calibration methods.

51502

APTIC NO. 75314

Ludwig Krohne Co., Duisburg (Germany)

BETA DUST METER: A RADIOMETRIC DUST MEASURING DEVICE. (Radiometrisches Staubmessgeraet

AIR POLLUTION ABSTRACTS, OCTOBER 1975

Beta-Staubmeter). Preprint. Translated from German. Leo Kanner Associates, Redwood City, Calif., 11p., Feb. 1975.

A radiometric dust measuring device, known as the beta dust meter, for stack monitoring is described that functions independently of the type of dust and the grain size. Operation of the system involves first exposing a dust-free fiber glass band to the carbon-14, with the pulses being measured for 1 min and stored by a Geiger-Mueller counter. After this zero point measurement, the filter box is opened and the filter band is moved back by one standard width into the filter box. The gas sample is then drawn through the filter band by a Roots blower. All dust particles with a grain size greater than 0.2 micron are separated. The filter box is returned to the radiometric measuring system, and the pulse rate attenuated by the dust coverage is measured. The two pulse rates are transformed, stepped down, and converted to an analog direct current signal. The quotient of these two signals is directly proportional to the dust coverage. The dust sample is obtained by the branch current method, and the sampling probe is motor-driven to move through an arc in the duct.

1974

51503

APTIC NO. 74255

Arora, P. K.

A CONTINUOUS MONITOR FOR CARBON MONOXIDE IN THE AIR. Indian J. Technol. (India), 12(2):71-74, Feb. 1974. 3 refs.

A continuous monitor for ambient carbon monoxide measurements is described. The principle of detection is based on the measurement of temperature rise resulting from the heat generated during the exothermic conversion of CO to carbon dioxide in the presence of Hopcalite, a commercial catalyst. A thermistor embedded in the catalyst and connected in a bridge circuit with a reference thermistor senses the temperature rise and generates an electrical signal which can be used to activate an appropriate read-out service. The lower detection limit of the instrument is 5 ppm ambient CO. The zero drift is less than 1% of full scale for 24 hr of continuous operation. The time to 80% response of the recorded concentration is 5 min.

51504

APTIC NO. 74284

Ascik, Kazimierz

DETERMINATION OF CHLORINE DIOXIDE IN THE AIR. (Metoda oznaczania zawartosci dwutlenku chloru w powietrzu). Text in Polish. Przegl. Papier., 30(4):158-160, 1974. 7 refs.

A colorimetric method for determining airborne chlorine dioxide is described. The method is based on the formation of a colored complex resulting from the reaction of chlorine dioxide with 8-amino-1-naphthol-3,6-disulfonic acid. This reaction takes place in a buffer solution containing acetic acid (pH 4.2 to 4.1) and iron ions. A solution of 0.85 g (0.0025 mol) of purified and dry acid is dissolved in 50 ml of ethylene glycol and is slowly warmed in a water bath. Then, 50 ml of redistilled water is added. The light green solution is stable at room temperature for a week if it is kept in a dark container at 5°C. The basic solution of chlorine dioxide is prepared by Rapson's method. The sample chlorine dioxide solution contains 0.1 mg of chlorine dioxide/l ml of water.

51505

APTIC NO. 73939

Benarie, Bodin, Chuong, and Nonat

SELECTIVE DETERMINATION OF SULFURIC ACID IN THE AIR. (Dosage selectif de l'acide sulfurique dans l'atmosphere). Text in French. Chim. Actualites, no. 1538:33-36, Oct. 1974.

A method of air sampling for the selective determination of sulfur trioxide is described. Air sampled for the determination of sulfur dioxide passes through a filter previously im-

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pregnated with a 5% solution of ferrous sulfate and 5% glycerin. Ferrous sulfate quantitatively retains SO₃ and sulfuric acid, and releases 92% SO₂. The alternate use of the filter makes possible the determination total sulfur content and the SO₂ concentration; the SO₃ concentration can be calibrated from the difference of total sulfur and sulfur dioxide concentrations.

51506

APTIC NO. 73691

Brinkmann, U.

REPORT ON THE 6TH INTERNATIONAL LASER-RADAR CONFERENCE IN SENDAI, JAPAN, HELD SEPT. 3 TO 6, 1974. ASSORTED STUDIES ON TRACE ANALYSIS. (Bericht von der 6. Internationalen Laser-Radar-Konferenz in Sendai, Japan, vom. 3 - 6. September 1974. Auswahl von Arbeiten zur Spurenanalyse). Text in German. Landesanstalt fuer Immissions- und Bodennutzungsschutz des Landes Nordrhein-Westfalen, Essen (Germany), Laser-Tag, Stand Anwendungstech. Lasern Geb. Luftreinhaltung, Essen, Germany, 1974, p. 184-190. 11 refs. (Oct.)

Papers presented on trace analysis at the 6th International Laser-Radar Conference in Sendai, Japan, from Sept. 3-6, 1974, are reviewed. Nitrogen dioxide in a concentration range of 30-160 ppb was measured by a nitrogen laser-pumped absorption type two-wavelength dye laser radar. In another study, NO₂ concentration measurements were done with a two-wavelength dye laser in combination with sample-and-hold integrators and a transient recorder. Atmospheric ozone was measured by a differential absorption technique using a carbon dioxide laser. Atmospheric carbon dioxide was measured by tunable diode lasers (Pb SO₂ SE0.18 laser). Ozone measurements in the high layers of the atmosphere can be made with resonance Raman scattering. Aircraft engine emissions can be measured by Raman and fluorescence lidar techniques.

51507

APTIC NO. 75129

Burns, E. A., A. Grant, and C. A. Flegal

INSTRUMENTAL ANALYSES FOR WET SCRUBBING PROCESSES (FINAL REPORT). Systems Group of TRW, Inc., Redondo Beach, Calif., Environmental Protection Agency Contract 68-02-0007, Program Element 1A8013, ROAP 21ACX-096, Rept. EPA-650/2-74-064, 17551-6028-RU-00, 331p., July 1974. 42 refs.

NTIS: PB 240616/AS

Continuous onstream monitoring methods for the optimization and control of various wet scrubbing processes were developed, with particular emphasis on the use of continuous on-line methods for slurry sampling and separation that do not disturb the chemical steady state condition. Sampling methods were developed for a 30 second phase separation, and instrumentation was identified for the analysis of various components in the solid and liquid phases of limestone and dolomite scrubbing processes. A mobile laboratory was designed and outfitted for the characterization of flue gas desulfurization streams using automated instruments for the analysis of sulfur dioxide, nitrogen oxides, carbon monoxide, carbon dioxide, hydrocarbons, water, and oxygen. Recommended analytical methods were selected for ammonia, double alkali, magnesium oxide, Stone and Webster/Ionics, and Wellman-Lord processes. (Author abstract modified)

51508

APTIC NO. 73684

Carnuth, W.

LIDAR SYSTEM FOR THE REMOTE MEASUREMENT OF ATMOSPHERIC AEROSOLS, AND PRELIMINARY RESULTS. (Ein Lidar-System zur Fernmessung atmosphärischer Aerosole und erste Ergebnisse). Text in German. Landesanstalt fuer Immissions- und Bodennutzungsschutz des Landes Nordrhein-Westfalen, Essen (Germany), Laser-Tag, Stand Anwendungstech. Lasern Geb. Luftreinhaltung, Essen, Germany, 1974, p. 70-83. 7 refs. (Oct.)

Preliminary results of experiments with lidar measurements of atmospheric aerosols, carried out simultaneously with impactor and Aitken nuclei counter measurements at three mountain meteorological stations are presented. The lidar equipment utilized a ruby laser with and without frequency doubling, and a Biomation 8100 model transient recorder. High particle concentrations below inversion layers and very low concentrations within such layers were found. The aerosol structures were generally much weaker in the ultraviolet signal than in the visible red signal without frequency doubling, and could not be attributed solely to the increase of the Rayleigh fraction.

51509

APTIC NO. 75147

Conner, William D.

MEASUREMENT OF THE OPACITY AND MASS CONCENTRATION OF PARTICULATE EMISSIONS BY TRANSMISSOMETRY. Environmental Protection Agency, Research Triangle Park, N. C., Chemistry and Physics Lab., Program Element 1AA010, ROAP 26AAM, Rept. EPA-650/2-74-128, 37p., Nov. 1974. 23 refs.

NTIS: PB 241251/AS

The transmissometric measurement of opacity and mass concentration of stack particulate emissions is reviewed. Transmissometers used to measure the opacity of particulates possess two essential design features: the spectral response of the instrument is limited to visible light (sensitive to green light mostly) and the light collimating optics of the instrument exclude light scattered by the particulates from measurement. Although only a limited opacity-mass concentration relationship can be expected between sources of different sizes and particulate characteristics, a good opacity-mass concentration relationship can be obtained for sources with stable particulate characteristics. Such a relationship is usually developed by empirical calibration of a transmissometer on the source with an accepted manual gravimetric sampling method. Two relatively simple methods exist for remote instrumental measurement of opacity. They are through-the-plume photometry of the sun and telephotometry of contrasting targets. A more general lidar method for remote opacity measurements is currently being developed.

51510

APTIC NO. 75119

Constant, Paul C., Jr., Michael C. Sharp, and George W. Scheil
COLLABORATIVE TEST OF THE TGS-ANSA METHOD FOR MEASUREMENT OF NITROGEN DIOXIDE IN AMBIENT AIR. Midwest Research Inst., Kansas City, Mo., Environmental Protection Agency Contract 68-02-1363, Program Element 1HA327, ROAP 26AAF, Rept. EPA-650/4-74-046, 132p., Sept. 1974. 2 refs.

A collaborative test to determine the precision and bias of the tentative method for the determination of nitrogen dioxide in air, known as the TGS-ANSA Procedure was conducted among 10 participating laboratories. The TGS-ANSA Procedure involves collecting nitrogen dioxide by bubbling air through a solution of triethanolamine, guaiacol, and sodium metabisulfite (TGS) and determining colorimetrically the nitrate ion produced during sampling by reacting the exposed absorbing reagent with sulfanilamide and 8-anilino-1-naphthalenesulfonic acid, ammonium salt (ANSA). The TGS-ANSA procedure, as written, resulted in an average bias of 9.5 micrograms/cu m over the range of 50-300 micrograms/cu m. The within-laboratory standard deviation was 7.5 micrograms/cu m, and the collaborator standard deviation was 8.8 micrograms/cu m.

51511

APTIC NO. 72011

Cristello, J. C.

EVALUATION OF LEAR SIEGLER TRANSMISSOMETER. Preprint, Environmental Services, Camas, Wash., 4p., Nov. 5, 1974.

Field tests involving across-the-stack opacity measurements of a hog boiler plume with a Lear Siegler transmissometer were

conducted to compare the accuracy of the device with that of visual measurements. The instrument was mounted sufficiently high on the stack to eliminate any possible errors attributable to the sighting tube. Opacity readings with the transmissometer over two sets of observations averaged 47.9 and 24.1 as compared to mean visual opacity values of 41.4 and 34.7. The average error during the measurement was less than 10%.

51512

APTIC NO. 74060

Dotrepe-Grisard, N., M. M. Respen, and R. Deswaef

COMPARATIVE INVESTIGATION OF FOUR SETTLING DUST SAMPLERS. (*Etude comparative de 4 appareils de prelevement des poussières sedimentables*). Text in French. Centre Belge Etude Doc. Eaux, no. 373:508-515, Dec. 1974. (Presented at the CEBEDEAU Conference, Liege, Belgium, May 6, 1974.)

Statistically analyzed measurement data obtained by means of four different types of settling dust samplers (Owen and Bergerhoff gauges, vaseline-coated disk, and Liege type ball) exposed simultaneously in urban, mixed urban-industrial, and industrial air in Belgium is presented. The statistical analysis of the data obtained revealed the impossibility of valid comparison between the individual methods taken as pairs. However, satisfactory correlation was obtained between the Owen and Bergerhoff gauges in a rather great number of cases, and between either of these gauges and the vaseline-coated disk in a smaller number of cases, and between either gauge and the Liege type ball in an even smaller number of cases. The findings indicate that results obtained by different gauges should be accepted and compared with caution, and an internationally standardized type of dustfall sampler should be adopted.

51513

APTIC NO. 73864

Duncan, L. J., E. J. Friedman, E. L. Deitz, and E. A. Ward

AN AIRBORNE REMOTE SENSING SYSTEM FOR URBAN AIR QUALITY. *Mitre Corp., Washington, D. C., National Aeronautics and Space Administration Contract F-19628-73-C-001, Proj. 8190, Rept. MTR-6601, NASA CR-132499 271p., Feb. 1974. 96 refs.*

NTIS: N74-33836

Several National Aeronautics and Space Administration air quality developed remote sensors are evaluated in terms of their capability for making urban air quality measurements, using ground station data and outputs of dispersion models for sulfur dioxide and carbon dioxide to establish the expected performance and limitations of the sensors. All of the remote sensors studied produce results in the form of total column density measurement of the pollutant from the radiation source to the sensor, and interpretation of these results is necessary for comparison with dispersion model results and ground readings for surface values. Thus data reduction programs must be developed in concert with sensor development. All of the passive remote sensors studied require either clear sky or optical line-of-sight from the radiation source to the instrument. The passive thermal infrared sensors possess an instrument resolution capability which is limited to about 2 K. The spatial resolution of the various remote sensors is on the order of 100 m. The airborne system capital costs, when compared with the cost of existing ground networks, are reasonable in terms of potential value of the data generated. (Author summary modified)

51514

APTIC NO. 71851

Garland, J. A.

THE INTEGRATING NEPHELOMETER AS AN INSTRUMENT FOR MEASURING THE SCATTERING COEFFICIENT OF THE ATMOSPHERE AND ITS USE IN ATMOSPHERE POLLUTION STUDIES. *Preprint, p. 490-504, 1974 (?). 25 refs.*

Applications of the integrating nephelometer to the measurement of atmospheric scattering and to studies of atmospheric

pollution are reviewed. Among various practical methods for observing the optical quality (visibility) of the air, only the integrating nephelometer makes a very local measurement. The nephelometer is therefore the best suited instrument for investigating the effects of such variables as aerosol concentration and composition and relative humidity on the scattering coefficient. Since the instrument is readily portable, it is also useful for examining spatial variations in aerosol concentrations. Aside from visibility and vertical aerosol profile measurements, nephelometer measurements can be made sequentially at several wavelengths with different filters to obtain information on the aerosol size distribution if the aerosol follows the power law model.

51515

APTIC NO. 75339

Greifer, Bernard and John K. Taylor

POLLUTANT ANALYSIS COST SURVEY (FINAL REPORT). *Dept. of Commerce, Washington, D. C., National Bureau of Standards, Environmental Protection Agency Interagency Agreement IAG 215, Program Element 1AB013, ROAP 21ADD-BJ, Rept. EPA-650/2-74-125, 208p., Dec. 1974. 772 refs.*

NTIS: PB 241991/AS

The capabilities and costs of various analytical methods for trace element determinations in fly ash, coal, oil, ores, minerals, metals, alloys, organometallics, incinerator particulates, slurry streams, and sedimentation process feeds are summarized. Analytical methods covered include nuclear activation, mass spectrometry, X-ray fluorescence, electron and ion microprobe spectrometry, atomic absorption spectrophotometry, emission spectrophotometry, polarography, and potentiometry. These methods are evaluated in terms of their capability for determining trace amounts (less than 100 ppm) of mercury, beryllium, cadmium, arsenic, vanadium, manganese, nickel, antimony, chromium, zinc, copper, lead, selenium, boron, fluorides, lithium, silver, tin, iron, strontium, sodium, potassium, calcium, silicon, magnesium, uranium, and thorium. A selected bibliography and a review of the Standard Reference Materials available for environmental analysis are also presented.

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APTIC NO. 73694

Guers, K.

REMOTE ANALYSIS OF GASES BY COMPARATIVE ABSORPTION MEASUREMENTS WITH LASERS.

(*Gas-Fernanalyse durch vergleichende Absorptionmessung mit Laser*). Text in German. Landesanstalt fuer Immissions- und Bodennutzungsschutz des Landes Nordrhein-Westfalen, Essen (Germany), *Laser-Tag, Stand Anwendungstech. Lasern Geb. Luftreinhaltung, Essen, Germany, 1974, p. 207-229. 9 refs. (Oct.)*

possibilities of gas remote analysis by comparative absorption measurements with laser are described. Laser-Raman-radar systems, using short-wave lasers (such as ruby or nitrogen), are suitable for the detection of air pollutants in flue gas plumes up to 1 km. Fluorescence spectroscopy is usable for the detection of metal vapors and molecular gases in the atmosphere. Gas analysis by direct or comparative absorption measurements, such as fluorescence spectroscopy, requires the coincidence of an absorption line of the gas to be analyzed with a laser emission line. This is possible in the visible and near ultraviolet spectral range. The limit of detectability lies well below the natural concentration of air pollutants. Comparative absorption measurement is characterized by an especially great measurement range and high sensitivity. This method can be also adopted for global measurements of ecological factors, such as humidity, and carbon dioxide content by means of satellites. Pulsed tunable TEA laser systems are especially promising in the area of air pollution monitoring.

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APTIC NO. 75126

Hamil, Henry F., David E. Camann, and Richard E. Thomas

COLLABORATIVE STUDY OF METHOD FOR THE DETERMINATION OF SULFURIC ACID MIST AND SULFUR DIOXIDE EMISSIONS FROM STATIONARY SOURCES. Southwest Research Inst., San Antonio, Tex., Environmental Protection Agency Contract 68-02-0626, Program Element 1HA327, ROAP 26AAG, Rept. EPA-650/4-75-003, 60p., Nov. 1974. 8 refs.

NTIS: PB 240752/AS

Collaborative tests to determine the precision and accuracy of the Environmental Protection Agency Method 8 for the determination of sulfuric acid mist and sulfur dioxide emissions from stationary sources were performed. Method 8 specifies that a gas sample be extracted from a sampling point in the stack and that the acid mist, including sulfur trioxide, be separated from SO₂. Both fractions are then measured separately by the barium-thorin titration method. The precision components for the SO₂ data were independent of the mean level, and the estimated between-laboratory standard deviation was 98.60 lb/standard cu ft times 10 to the -7 power, with 3 deg of freedom. The within-laboratory standard deviation was 76.94 lb/standard cu ft times 10 to the -7 power, with 40 deg of freedom. The laboratory bias deviation was 61.66 lb/standard cu ft times 10 to the -7 power. The precision components for the H₂SO₄ mist data were proportional to the mean level, and the between-laboratory standard deviation was 95.8% of the mean, with 3 deg of freedom. No within-laboratory or laboratory bias terms were estimated due to the high values obtained. Analyses of unknown sulfate solutions for the evaluation of the accuracy and precision of the analytical phase were performed, and the within-laboratory standard deviation was 2.19 times 10 to the -7 lb/standard cu ft. The between-laboratory standard deviation was 3.68% of the mean, and the laboratory bias standard deviation was 3.53% of the mean. The analytical phase was accurate within the precision of the method for concentration levels ranging from 158.6 times 10 to the -7 to 669.8 times 10 to the -7 lb/standard cu ft. (Author summary modified)

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APTIC NO. 74038

Heinrich, G. and H. Guesten

FLUORESCENCE SPECTROSCOPIC DETERMINATION OF CARCINOGENIC POLYCYCLIC AROMATIC HYDROCARBONS IN THE ATMOSPHERE.

(Fluoreszenzspektroskopische Bestimmung kanzerogener polycyclischer Kohlenwasserstoffe in der Atmosphäre). Text in German. In: *Chemische Reaktionen atmosphärischer Schadstoffe. Kernforschungszentrum Karlsruhe (West Germany). Inst. fuer Radiochemie, Rept. KFK 1975 UF, p. 77-94, May 1974. 9 refs.*

A fluorescence spectrometric method for identifying carcinogenic polynuclear compounds in the atmosphere was developed. Concentrations as low as 10 to the -9 mol/l of hydrocarbons like benzo(3,4)pyrene were detected. Polynuclear aromatics were quantitatively analyzed without chromatographic separation by means of selective excitation and/or oxygen quenching. Benzo(3,4)pyrene and benzo(k)fluoranthene were determined in presence of non-carcinogenic hydrocarbons via their absolute fluorescence spectra. The concentrations of benzo(3,4)pyrene and benzo(k)fluoranthene in airborne particulate samples from Karlsruhe were 1.9 micrograms/1000 cu m and 1.0 micrograms/1000 cu m, respectively.

51519

APTIC NO. 74077

Ishida, K., A. Shigeta, A. Endo, I. Maeda, and W. Kawai

STUDIES ON MEASURING METHODS FOR NITRILES. (STUDIES ON A METHOD OF MEASURING HARMFUL GASES (NO. 1)). (Nitriru rui no sokutei ho ni kansuru kenkyu (Yugai gas sokuteihoho ni kansuru kenkyu - No. 1)). Text in Japanese. Okayamaken Kogai Boshu

Center Kenkyu Hokoku (Bull. Okayama Prefect. Pollut. Control. Cent.), 2(1):7-11, 1974. 5 refs.

A glass column (3 mm by 3 m) packed with 1,2,3-tris(2-cyanoethoxy) propane (25%) on shimalite (80/100 mesh) and a flame ionization detector were used for analysis of acrylonitrile and acetonitrile. The analytical conditions were as follows: column temperature, 80 C; detector temperature, 150 C; carrier gas, nitrogen at 50-60 ml/min; hydrogen gas, 40 ml/min; air pressure, 1.0 kg/cu m. The above column system gave better resolution than conventional column systems including PEG 600 (10%) on Chromosorb (60/80 mesh), PEG 600 (10%) on Shimalite (60/80 mesh), T.C.P. (20%) on Shimalite (60/80 mesh), and Apiezon L (25%) on Shimalite (60/80 mesh). Smooth borosilicate glass was an ideal column material for better reproducibility. Removal of moisture in the sample prior to analysis was necessary in order to eliminate interference.

51520

APTIC NO. 74039

Jansson, Anders and Bengt Steen

PERFORMANCE OF VERTICAL ELUTRIATORS FOR AIRBORNE PARTICLES IN A CROSS WIND. Swedish Water and Air Pollution Research Lab., Gothenburg, Rept. B 185, 23p., Jan. 1974. 8 refs.

The effect of cross wind velocity on the entrance efficiency of four different particulate sampling probes was studied in an open wind tunnel. Cross wind velocities of up to 9 m/sec, entrance flow velocities of from 1.5 to 6.2 mm/sec, and talc powders with mean particle diameters of 4 and 8 micron were used. The collection efficiency generally decreased with increased wind speeds. A funnel with a mouth diameter of 50 mm showed with overestimation of particle concentration; only small changes with cross wind speed were observed. The probe sampled particles considerably larger than those in the respirable range. A cylindrical probe with a diameter of 50 mm showed an entrance efficiency very close to the calculated efficiency, and no significant change with wind speed was detected. Although the probe was very promising for the sampling of respirable dust, its sampling rate was only 0.26 cu m/24 hr. A similar probe with a diameter of 99 mm and capable of sampling at a rate of 1 cu m/24 hr was tested, but the entrance efficiency varied significantly with cross wind speed. The entrance efficiency of a Millipore filter assembly with a 32 mm diameter cylindrical probe also varied significantly with cross wind speed. (Author summary modified)

51521

APTIC NO. 74078

Katou, Tatsuo and Yoshio Iwamatsu

A SELECTIVE ANALYSIS BY THE REACTOR TUBE TRAP - GC METHOD FOR THE ALDEHYDES IN THE AIR. (Kankyo arudehido rui no kotai hannokan hosoku - GC ho ni yoru sentaku bunseki). Text in Japanese. Yokohama Koruritsu Daigaku Kankyo Kagaku Kenkyu Senta Kiyo (Bull. Inst. Environ. Sci. Technol., Yokohama Natl. Univ.), 1(1):12-18, 1974. 2 refs.

A reactor tube 1.5 cm in diameter and 15 cm long was packed with 7 g glass beads coated with 2,4-dinitrophenylhydrazine (1% by weight). Sample gas containing carbonyl compounds was passed through the tube at 1-5 l/min while the reactor tube was heated at 50 C. The reactor tube was transferred to a decomposition-regenerator where the volatile substances were removed by heating at 100 C with nitrogen being passed through. About 14 g of phthalic anhydride was mixed with the hydrazones which were then heated at 200 C for 30 min while N₂ was passed at 200 ml/min. The regenerated carbonyl compounds were analyzed by a glass column (3 mm by 3 m) packed with tricresyl phosphate (25%) on Chromosorb W AW (60/80 mesh) with N₂ at 50 ml/min as carrier gas. Many low boiling carbonyl compounds could be analyzed with desirable accuracy at the ppb level. The method was applied to the detections of carbonyl compounds in automotive exhaust and tobacco smoke.

51522

APTIC NO. 74097

Katou, Tatsuo and Shinji Nakayama

POLLUTANTS ANALYSIS IN THE INDUSTRIAL AREA BY GC-MS TECHNIQUE. (GC-MS gijutsu ni yoru kojochiku kankyo no osenkiko no kaimei). Text in Japanese. Yokohama Kokuritsu Daigaku Kankyo Kagaku Kenkyu Senta Kiyo (Bull. Inst. Environ. Sci. Technol., Yokohama Natl. Univ.), 1(1):27-36, 1974. 5 refs.

Sample gas (100 l for environmental gas and 200 l for sub-microgram quantities of pollutant) was passed through a 17 m by 3 cm tube packed with 30 g of soda lime and 50 g of anhydrous potassium carbonate for decarbonation and dehydration. The resulting gas was condensed in a 30 cm by 2 cm U tube packed with 20-50 mesh Kieselguhr and cooled with liquid oxygen. The gas was then introduced to a gas chromatography-mass spectrometry system by heating the U tube. The analytical conditions were as follows: GC: glass column 3 mm by 2.8 m packed with 25% TCP on chromosorb W AW (60/80 mesh) plus 0.2 m packed with 25% Silicone SE-52 on chromosorb W AW (60/80 mesh); carrier gas, helium (30 ml/min); column temperature, 250 C; detector, thin layer chromatogram and flame ionization detector. Industrial chemicals and solvents below ppb order were detected in many areas. At the Dainippon Paint Co., methanol, ethanol, and toluene concentrations in air were as high as 3420 ppb, 943 ppb and 866 ppb, respectively. The air in the industrial areas of Kawasaki city, Ichihara city and Yoshihara city contained various hydrocarbons, aldehydes, ketones, acetates and halogenated hydrocarbons.

51523

APTIC NO. 73696

Klapheck, K.

DIGITAL PRESENTATION AND EVALUATION OF LIDAR SIGNAL AT THE AACHEN METEOROLOGICAL OBSERVATORY. (Digitale Messwerterfassung und -auswertung von Lidar-Signalen am Meteorologischen Observatorium Aachen). Text in German. Landesanstalt fuer Immissions- und Bodennutzungsschutz des Landes Nordrhein-Westfalen, Essen (Germany), Laser-Tag, Stand Anwendungstech. Lasern Geb. Luftreinhaltung, Essen, Germany, 1974, p. 259-264. 2 refs. (Oct.)

Equipment and methodologies for the digital presentation and evaluation of lidar signals obtained in the course of air pollutant concentration measurements for the localization of emission plumes from stacks and cooling towers are described. The oscilloscope image is directly scanned with a television camera that is connected with a high-speed counter which feeds a computer store. The data recording has now been essentially improved by the use of a Biomation 8100 model transient recorder. The information can be stored on punched or magnetic tape. The use of an on-line computer would be an ideal solution, permitting also mobile use of the lidar system.

51524

APTIC NO. 73681

Krautscheid, S.

METEOROLOGICAL REQUIREMENTS OF LIDAR SYSTEMS WITH REGARD TO EMISSION MONITORING. (Messtechnische Anforderungen an Lidar-Systemen im Hinblick auf die Emissionsueberwachung). Text in German. Landesanstalt fuer Immissions- und Bodennutzungsschutz des Landes Nordrhein-Westfalen, Essen (Germany), Laser-Tag, Stand Anwendungstech. Lasern Geb. Luftreinhaltung, Essen, Germany, 1974, p. 9-19. (Oct.)

Requirements of lidar systems to be used for air pollution and pollutant emission monitoring are described. Lidar systems must be able to supply relevant and reliable emission data, and be usable at night. Measurements by lidar systems utilize Mie scattering, Raman scattering, or absorption measurement. Backscattering techniques are currently available for measurement of flue gas plumes. Quantitative determination of the particle density in flue gas plumes is possible by reflection or transmission measurement.

51525

APTIC NO. 73683

Kuelske, S.

MEASUREMENT OF PARTICULATE COMPONENTS IN NEAR-SURFACE AIR LAYERS - PRACTICAL EXPERIENCES AND MEASUREMENT DATA WITH SPECIAL REGARD TO THE STUDY OF THE DISPERSION OF FLUE GAS PLUMES. (Messungen von partikelfoermigen Bestandteilen in bodennahen Luftschichten - praktische Erfahrungen und Messergebnisse insbesondere im Zusammenhang mit der Untersuchung der Ausbreitung von Rauchfahnen). Text in German. Landesanstalt fuer Immissions- und Bodennutzungsschutz des Landes Nordrhein-Westfalen, Essen (Germany), Laser-Tag, Stand Anwendungstech. Lasern Geb. Luftreinhaltung, Essen, Germany, 1974, p. 45-60. (Oct.)

Measurements of particulate components in the near-surface atmosphere by means of a ruby laser lidar system are described. The height of boundary layers, including inversion layers, can be determined by lidar measurement from the abrupt reduction of the measured aerosol concentration inside and beyond such layers. The boundary effect occurs even in transitions to slightly stable stratifications, not only during inversions. The dispersion and lift of flue gas plumes can be determined by scanning vertical sections of the atmosphere at different distances from the emission source. The lift was strongly reduced with increasing wind speeds. Lidar alone is not suitable for the determination of particulate emission concentrations, and the statistical correlation between the concentration values determined by lidar and smoke density meters at the emission source is variable for the individual emission source. In addition, the transmission measurement through plumes with high particulate concentration results in false extinction values.

51526

APTIC NO. 73695

Kuper, G. and D. Ebeling

RAMAN LIDAR MEASUREMENTS OF HARMFUL GASES IN THE ATMOSPHERE. (Raman Lidar-Messungen von Schadgasen in der Atmosphaere). Text in German. Landesanstalt fuer Immissions- und Bodennutzungsschutz des Landes Nordrhein-Westfalen, Essen (Germany), Laser-Tag, Stand Anwendungstech. Lasern Geb. Luftreinhaltung, Essen, Germany, 1974, p. 230-243. (Oct.)

Preliminary measurements of harmful gases in the atmosphere utilizing a Raman lidar are presented. The sender and receiver of the measuring system were shifted instead of being arranged coaxially so that the sender beam and the receiver field overlap 50 m in front of the instrument. A ruby laser with 100 MW power and 1 pulse/sec was used. The theoretical maximum sensitivity was achieved practically when a narrow-band filter set was used, but the replacement of the filter set by a spectrograph resulted in a considerable reduction of sensitivity. The Raman lidar system was suitable for measurements of harmful gases in the ppm range at acceptable distance during the night, twilight, and at times when the sky was overcast. The system can be improved by increasing the laser power, reducing the beam divergence, and by the use of a two-stage multichannel plate.

51527

APTIC NO. 75253

McNulty, K. J., J. F. McCoy, J. H. Becker, J. R. Ehrenfeld, and R. L. Goldsmith

INVESTIGATION OF EXTRACTIVE SAMPLING INTERFACE PARAMETERS (FINAL REPORT). Abcor, Inc., Cambridge, Mass., Walden Research Div., Environmental Protection Agency Contract 68-02-0742, Task 27, Program Element 1AA010, ROAP 26AAP, Rept. RPA-650/2-74-089, 205p., Oct. 1974. 40 refs.

NTIS: PB 242515/AS

Laboratory and field studies of extractive interfaces for the continuous stack monitoring of nitrogen oxides and sulfur

MEASUREMENT METHODS

51533

dioxide from power plants, nitric acid plants, and sulfuric acid plants are reported. A sample line size of 6.35 mm (outside diameter) is recommended for typical analyzer flow rates. Coarse filtration is required before the sample is withdrawn from the stack for combustion sources. Negligible absorption on interface components is observed for Teflon, 316 SS, and polypropylene; small effects are observed for nylon, and large effects are seen with polyethylene and Tygon. Loss of SO₂ by catalytic oxidation to sulfur trioxide on particulates collected in the probe-tip filter is negligible; loss of NO by gas phase oxidation to nitrogen dioxide is appreciable if the residence time within the sampling system is very long. The loss of NO under normal sampling conditions, however, is within the tolerance limits of accuracy. Loss of SO₂ by absorption in condensate is negligible. The solubility of NO is much less than SO₂ and losses are again negligible. Nitrogen dioxide, however, is very soluble; and, if equilibrium is reached complete NO₂ loss can occur. (Author summary modified)

51528

APTIC NO. 74224

Moskowitz, Howard R., Andrew Dravnieks, William S. Cain, and Amos Turk

STANDARDIZED PROCEDURE FOR EXPRESSING ODOR INTENSITY. *Chem. Senses Flavor*, vol. 1:235-237, 1974, 8 refs.

A standardized procedure for expressing odor intensity based on the application of ratio scaling methods to normal-butanol dilutions is proposed. The presentation of various concentrations of n-butanol to subjects by dynamic, flowing procedures results in a relatively simple power function between judged odor magnitude and butanol concentration. A stimulus consisting of 250 ppm by volume of n-butanol in air appears to be subjectively neutral in pleasantness-unpleasantness, and this concentration is proposed for arbitrary designation as 10 odor intensity units. Other butanol concentrations can then be assigned odor intensity values in accordance with the power function for butanol. Such standardization yields the opportunity for odor control regulations to be expressed in terms of perceived magnitude.

51529

APTIC NO. 71566

Nelson, J. W., J. W. Winchester, and R. Akselsson

WORKSHOP ON NUCLEAR TECHNIQUES FOR ENVIRONMENTAL TRACE ELEMENT INFORMATION RELATIVE TO ENERGY PRODUCTION AND CONSUMPTION. *National Science Foundation, Washington, D. C., Energy-Related General Research Office, Workshop Nucl. Tech. Environ. Trace Elem. Inf. Relative Energy Prod. Consumption, Tallahassee, Fla. 1974, 41p. (June 23-26.)*

Progress in the trace element measurement of airborne particulates by automated nuclear techniques such as neutron activation analysis, X-ray emission spectrometry, and charged particle scattering analysis is reviewed, with particular reference to the production and use of energy. Aerosol studies involving the particle composition at various points within a coal-fired power plant, ambient aerosol composition in relation to meteorological variables and urban versus nonurban locations, and the dispersion of automotive emissions in the urban atmosphere are reviewed. Presentations are given on the following topics: the role of neutron activation analysis in relation to air pollution research objectives, air pollution research at the Tennessee Valley Authority, interlaboratory comparison of trace element analytical results, aerosol composition studies using accelerator proton bombardment, large-scale aerosol collection and analysis, the significance of remote marine aerosol studies in energy impact assessment, environmental sampling in remote areas, and the relation of trace metals to human health.

51530

APTIC NO. 73688

Pantani, L., L. Stefanutti, H. Herrmann, and C. Werner

VISUAL RANGE MEASUREMENT BY MEANS OF LIDAR. (*Lidarweitmessungen mit Hilfe des Lidars*). Text in German. *Landesanstalt fuer Immissions- und Bodennutzungsschutz des Landes Nordrhein-Westfalen, Essen (Germany), Laser-Tag, Stand Anwendungstech. Lasern Geb. Luftreinhaltung, Essen, Germany, 1974, p. 144-153. 7 refs. (Oct.)*

Visibility range measurements conducted with the DFVLR lidar system IV are presented. A ruby laser with an energy of 1 Joule and 1 pulse/min was used. The best results and best agreement between measured and calculated visibility range values were obtained by the aerosol Raman nitrogen method as a function of the backscattering coefficient.

51531

APTIC NO. 75078

Pellizzari, Edo E.

DEVELOPMENT OF METHOD FOR CARCINOGENIC VAPOR ANALYSIS IN AMBIENT ATMOSPHERES (FINAL REPORT). *Research Triangle Inst., Research Triangle Park, N. C., Environmental Protection Agency Contract 68-02-1228, Program Element IAA010, ROAP 21DEC-05, Rept. EPA-650/2-74-121, 161p., July 1974. 57 refs.*

NTIS: PB 239770/AS

An analytical technique was developed for evaluating collection efficiencies of candidate sorbents during the concentration of carcinogenic and mutagenic vapors from a flowing stream. The polymeric beads Tenax GC, Porapak Q, and Chromosorb 101 and 104 were 90% efficient or better in trapping such vapors as epoxides, beta-lactones, sulfonates, sultones, N-nitrosamines, chloroalkyl ethers, aldehydes, and nitro compounds from synthetic air/vapor mixtures at 0.25 l/min. A thermal desorption inlet-manifold was developed for recovering vapors trapped on an analyte and transferring the hazardous substances from sorbents to a gas-liquid chromatograph. Design criteria were developed for a field sampling system for collecting pollutants using a cartridge containing a solid sorbent. The methodology and instrumentation developed were applied to the analysis of air samples from the Los Angeles Basin area, and many aliphatic and aromatic compounds were identified in preliminary studies.

51532

APTIC NO. 74246

Quickert, N., A. Zdrojewski, and L. Dubois

THE ACCURATE MEASUREMENT OF VANADIUM IN AIRBORNE PARTICULATES. *Int. J. Environ. Anal. Chem.*, vol. 3:229-238, 1974, 14 refs.

The measurement of vanadium in airborne particulate material using both conventional flame atomic absorption spectrophotometry and atomic absorption with a graphite furnace atomizer was investigated, with particular emphasis on high-volume air samples collected on glass fiber filters. A part of the filter was subjected to acid digestion followed by atomic absorption analysis. Vanadium determinations were subject to large interferences from other elements when the flame mode was used: the elements aluminum, silicon, zinc, potassium, and sodium all gave an enhancement of the vanadium signal. The use of a heated graphite atomizer removed all interferences from the system and lowered the minimum detectable concentration by two orders of magnitude. The glass fiber filter blank for vanadium was below the detection limit which was 0.00025 micrograms/cu m for an air sample of 2000 cu m. (Author abstract modified)

51533

APTIC NO. 73689

Renger, W.

POSSIBLE USES OF LIDAR IN SPACELAB. (*Moglichkeiten des Lidareinsatzes an Bord von Spacelab*). Text in German. *Landesanstalt fuer Immissions- und*

Bodennutzungsschutz des Landes Nordrhein-Westfalen, Essen (Germany), Laser-Tag., Stand Anwendungstech. Lasern Geb. Luftreinhaltung, Essen, Germany, 1974, p. 154-165. 7 refs. (Oct.)

The possible uses of lidar in Spacelab, a joint program of the USA and western European countries, are described. Spacelab-borne lidar systems are suitable for three-dimensional probing, and provide for reduced dynamics of the backscattered signal. The planned lidar measurements on Spacelab will be concerned with the variations of the aerosol contents in space and time, of the upper limit of clouds, of air pollutants, and with measurements of the density in the orbital path. Aerosol measurements are possible either directly, or between the Spacelab-borne lidar system and a passive sub-satellite. Such gases as ozone, carbon monoxide, sulfur dioxide, carbon dioxide, nitric oxide, as well as water vapor, can be monitored.

51534

APTIC NO. 75115

Ringwall, Carl G.

COMPACT SAMPLING SYSTEM FOR COLLECTION OF PARTICULATES FROM STATIONARY SOURCES (FINAL REPORT). General Electric Co., Schenectady, N. Y., Environmental Protection Agency Contract 68-02-0546, Program Element 1A1010, Rept. EPA-650/2-74-029, 106p., April 1974. 5 refs.

NTIS: PB 240398/AS

A compact sampling system for the collection of particulates from stationary sources is described, with particular emphasis on the gas velocity sensor and a fluidic control amplifier. The sensor concept is based on the static pressure differential between the free air stream and the nozzle inlet. The fluidic control amplifier which interfaces directly with the sensor provides the control to automatically maintain isokinetic conditions. Field tests at both oil- and coal-fired power plants indicate that the sensor and controller can function with no degradation in performance under the adverse environment of representative power plant stacks. Temperatures of up to 205°C and solid particulate concentrations of 3.50 g/cu m can be tolerated by the sampling system. (Author abstract modified)

51535

APTIC NO. 75111

Roberds, D. W., W. M. Farmer, and A. E. Lennert

INTERFEROMETRIC INSTRUMENTATION FOR PARTICLE SIZE ANALYSIS (FINAL REPORT). Arnold Research Organization, Inc., Arnold Air Force Station, Tenn., Environmental Protection Agency Interagency Agreement EPA-IAG-0177(D), Program Element 1AA010, ROAP 26AAM, Rept. EPA-650/2-73-034, 59p., June 1974. 17 refs.

NTIS: PB 240584/AS

Results from experiments conducted to determine the characteristics and potential capabilities of particle size analysis with laser interferometer techniques are reported. The fringe visibility technique appears capable of being incorporated into a viable instrument for the real time analysis of particle sizes simultaneously with velocity measurements. Particle sizes from the millimeter range to 1 micron can be determined; however, the threshold of detection is not established. For self-aligning optics, 0.5 wavelengths of the illuminating beam appears to be the limit, e.g., in the case of the helium-cadmium laser, operating at 4416 Å, approximately 0.22 micron. The threshold is further lowered to 0.17 micron by operating the laser at 3250 Å. One-dimensional particle sizing experiments leave much to be desired, and two-dimensional particle sizing is a minimum condition for realizing reliable measurements.

51536

APTIC NO. 73687

Ruger, J.

VISIBILITY MEASUREMENT BY MEANS OF LIDAR. (Einsatz von Lidar zur Messung der Sichtweite). Text in German. Landesanstalt fuer Immissions- und Bodennut-

AIR POLLUTION ABSTRACTS, OCTOBER 1975

zungsschutz des Landes Nordrhein-Westfalen, Essen (Germany), Laser-Tag., Stand Anwendungstech. Lasern Geb. Luftreinhaltung, Essen, Germany, 1974, p. 126-143. 7 refs. (Oct.)

Slant range visibility measurements with lidar are described. Ruby laser and computerized data processing were applied. Each slant range visibility value was determined from eight lidar signals. A comparison of lidar-measured slant range visibility values with transmissometer measurements shows good agreement of the results obtained by the two methods. However, one transmissometer value corresponds to several slant range visibility values as measured with lidar, due to the fact that the integration time of 30 microsec adopted for the lidar measurement against the 3-second signal duration for the transmissometric measurement is too low to equalize the fluctuations caused by the steady motion of the aerosol particles.

51537

APTIC NO. 73682

Ruppersberg, G. H.

SURVEY OF QUALITATIVE AND QUANTITATIVE MEASUREMENTS OF ATMOSPHERIC PARTICULATE MATTER (PROBLEM AND THEORY OF QUANTITATIVE MEASUREMENT). (Ueberblick ueber qualitative und quantitative Messungen von Partikeln in der Atmosphaere (Problematik und Theorie der quantitativen Erfassung)). Text in German. Landesanstalt fuer Immissions- und Bodennutzungsschutz des Landes Nordrhein-Westfalen, Essen (Germany), Laser-Tag., Stand Anwendungstech. Lasern Geb. Essen, Germany, 1974, p. 23-44. 32 refs. (Oct.)

The state of the art of qualitative and quantitative measurements of atmospheric particulates by lidar is surveyed. The theory of lidar measurement is discussed with respect to extinction, scattering, and visibility. The particulate concentrations in the atmosphere can be evaluated from the visibility range measured by means of lidar systems. However, the optical properties of the aerosol particles in air with high humidity content are determined essentially by the condensed water. Lidar and backscattering measurements in clouds and fog yield greatly different values.

51538

APTIC NO. 74053

Sarteur, R. and J. C. Fayard

QUANTITATIVE EVALUATION OF AN ODOR BY SPECTRAL ANALYSIS. APPLICATION TO A REFINERY ODOR. (Contribution a l'estimation quantitative d'une odeur par analyse spectrale. Application a l'odeur d'une Raffinerie). Pollut. Atmos. (Paris), no. 64:398-404, Oct.-Dec. 1974. 7 refs.

A new method for the quantitative analysis of odors and odor nuisances as applied to malodorous emissions in a petroleum refinery is presented. Air is sampled by cryogenic technique for subsequent analysis by means of gas-chromatography with specific detector, and mass spectrometer for identification. This method permits the identification of the malodorous components, the individual contributions of the different malodorous substances identified to the overall odor nuisance with reference to the odor threshold, the individual contributions of the different components to toxicity with the maximum admissible concentration taken as a reference, and the relative contributions to the odor nuisance of different groups of organic compounds. Olefins and organosulfur compounds were solely responsible for the odor nuisances, while naphthenes and saturated hydrocarbons caused negligible odor nuisance.

51539

APTIC NO. 73693

Schroetter, H. W.

RECENT RAMAN LIDAR MEASUREMENTS IN THE USA. (REPORT ON THE FOURTH RAMAN CONFERENCE IN BRUNSWICK, MAINE). (Neue Raman-Lidar-Messungen in USA. (Bericht ueber Vortraeger bei

der 4. Raman- Konferenz in Brunswick, Maine)). Text in German. Landesanstalt fuer Immissions- und Bodennutzungsschutz des Landes Nordrhein- Westfalen, Essen (Germany), Laser-Tag, Stand Anwendungstech. Lasern Geb. Luftreinhaltung, Essen, Germany, 1974, p. 205-206. 4 refs. (Oct.)

Papers presented at the 4th International Conference on Raman Spectroscopy in Brunswick, Maine concerning Raman-lidar measurements carried out in the USA are reviewed. The measuring accuracy of the Raman-lidar method was controlled by measurement of the oxygen concentration as a function of the distance between 200 and 1600 m. The readings scattered between 20.4 and 21% without any perceivable distance-dependence. Organophosphorus compounds in the air can be detected by the utilization of the resonance Raman effect to a minimum concentration of 0.04 ppm at 300 m distance, and the maximum distance at which such compounds can be detected amounts to 1000 m. A new Raman-lidar instrument using a filter set in place of a polychromator and a Fresnel lens made of plexiglass 1.2 m in diameter in place of a Cassegrain telescope has been developed to increase the sensitivity, and consequently the maximum distance of detection.

51540

APTIC NO. 74084

Sigli, Paul, Marie-Florence Thal, and Pierre Zettwoog

PRINCIPLES OF INDUSTRIAL OLFACTOMETRY. (*Les bases de l'olfactometrie industrielle*). Text in French. *Polut. Atmos.* (Paris), no. 63:315-326, July-Sept. 1974. 9 refs.

Principles of the neurophysiological mechanism of olfactory perception and of industrial olfactometry are presented. Under laboratory conditions, the odor stimuli can be classified as a function of the olfactory intensity by category scaling between two limits ranging from zero (non-perception) to 100 (most concentrated solution), or by matching the intensities of two pure substances. In industrial olfactometry, the threshold dilution method and the matching method are used. An industrial olfactometer suitable for field measurements, composed of a shell isolated by an air curtain and two inhalation masks for test and reference gases has been developed. It is able to produce dilutions in proportions ranging up to 2500. Field measurements operate with three categories (absence of odor, faint or hardly perceptible odor, and strong odor). The polluted zone is subdivided into sections, and the odor intensity is classified by the jury in each sector at different times of the day as a function of the meteorological conditions that influence the dispersion. This odor matching method has the advantage of truly reflecting the nuisances both qualitatively and quantitatively, and the fluctuations in the odor intensity.

51541

APTIC NO. 73679

Skogerboe, I. K.

ANALYTICAL CHEMISTRY. In: *Environmental Contamination Caused by Lead (Interim Report)*. Colorado State Univ., Fort Collins, National Science Foundation Grants GI-34813X1 and GI-44423, p. 187-257, Dec. 31, 1974. 130 refs.

Analytical methods for the determination of environmental lead compounds occurring in air, soil, and other media are discussed along with related subjects. Topics covered include: the use of differential pulsed voltammetric stripping for the determination of lead and cadmium in biological tissues and water samples, an apparatus for the exposure of plants to lead aerosols, a modification of an atomic absorption unit for dual beam background correction measurements, an emission spectroscopic method for the multianalysis of atmospheric lead and other trace metals, the use of X-ray diffraction to identify soil lead compounds from automotive exhausts, the gas chromatographic determination of organic lead compounds in gasoline and in the atmosphere, an automated background correction system for a direct reading emission spectrometer, accuracy assurance in the analysis of environmental samples for lead and other heavy metals, a comparative evaluation of various analytical methods used for the characterization of particu-

lates, and the development of optical emission and inorganic mass spectrometric techniques for multielement analysis.

51542

APTIC NO. 74169

Tappi, J.

COMPARISON OF NOX METER. (*NOx shkuteiki no hikaku*). Text in Japanese. *Kami-pa Gikyoshi* (Japan. Tech. Assoc. Pulp Paper Ind.), 28(6):30-31, June 1974.

Methods for measuring nitrogen oxides, including nondispersive infrared analysis, chemiluminescence, ultraviolet absorption and potentiometry, are discussed and compared. Nondispersive infrared methods offer the best performance and low cost. However, greater dependability and accuracy in the lower range of NOx measurements can be obtained with chemiluminescent methods. The disadvantages of the latter method are high cost and effects of gas flow fluctuations. Ultraviolet methods are relatively free from interference effects. However, ultraviolet analysis is costly and unstable in the lower range of NOx measurement.

51543

APTIC NO. 74204

Ueno, Hiroshi

POLLUTION CONTROL AND MEASUREMENT EQUIPMENT BEING DEVELOPED BY THE INDUSTRIAL POLLUTION CONTROL ASSOCIATION (NON-PROFIT). Text in Japanese. *Sangyo Kogai* (Ind. Public Nuisance), 10(7):1986-1988, July 1974.

The development of various air pollution sampling and analytical devices is described. The devices include an analyzer for the determination of sulfur dioxide, nitric oxide, and nitrogen dioxide in stack gas; an automatic air sampler; and a photochemical smog sampler. The stack gas analyzer is based on the fact that SO₂, NO, and NO₂ give absorption maxima at 2869, 2261 and 3798 Å, respectively. The automatic air sampler can sample SO₂ and tracer gases at adjustable intervals for 12 hr. The photochemical smog sampler can sample several gases simultaneously and is portable.

51544

APTIC NO. 73690

Walther, H.

GENERAL SURVEY OF METHODS FOR THE MEASUREMENT OF GASEOUS COMPONENTS IN NEAR-SURFACE LAYERS OF THE ATMOSPHERE.

(*Allgemeiner Ueberblick ueber die Methoden zur Messung von gasfoermigen Bestandteilen der Atmosphaere in bodennahen Luftschichten*). Text in German. Landesanstalt fuer Immissions- und Bodennutzungsschutz des Landes Nordrhein-Westfalen, Essen (Germany), Laser-Tag, Stand Anwendungstech. Lasern Geb. Luftreinhaltung, Essen, Germany, 1974, p. 171-183. 12 refs. (Oct.)

Methods available for the measurement of gaseous compounds in the atmosphere are reviewed. Emission spectroscopic detection of gaseous components in the atmosphere is possible by mixing variable-frequency laser rays with the radiation from the atmosphere in a photodetector. Raman scattering techniques are suitable for the simultaneous detection of several gaseous components in the atmosphere. Resonance fluorescence measurements are problematic due to the wide spectral range of the rotation- and vibration-generated fluorescence, especially in the lower layer of the atmosphere, while lidar fluorescence measurement is suitable for the detection of sodium atoms up to an altitude of 95 km. Dye lasers are suitable for use over the entire visible spectral range, and even in the near ultraviolet and infrared ranges following frequency modification. Diode lasers and parametric oscillators are promising as variable- frequency lasers in the near IR range. Absorption measurements over fixed absorption distances have sensitivities in the ppb range. The differential absorption method is most sensitive of all lidar techniques, without requiring a variable-frequency laser in the IR spectral range.

51545

APTIC NO. 74054

Wickert, H.

A SIMPLE APPROXIMATION METHOD FOR CORRECTING THE INTERELEMENT EFFECTS IN X RAY FLUORESCENCE ANALYSIS. (Ein einfaches Naehungsverfahren zur Korrektur der Interelementeneffekte bei der Roentgenfluoreszenz-Analyse). Text in German. Zement-Kalk-Gips (Wiesbaden), 27(12):607-609, 1974. 5 refs.

A convenient approximation method is described whereby the inter-element effects in X-ray fluorescence analysis can largely be corrected. This method can be applied to all substances that normally have to be analyzed in the cement testing lab, ranging from lime and clay through clinker to filter dust and coating from the interior of kilns. For each element or oxide only one calibrating equation is used.

51546

APTIC NO. 74274

Williams, Kevin G.

THE CONTINUOUS MEASUREMENT OF HYDROGEN CHLORIDE IN THE AMBIENT ATMOSPHERE USING THE DUAL ISOTOPE INFRARED ABSORPTION TECHNIQUE. Andros Inc., Berkeley, Calif., National Aeronautics and Space Administration Contract NAS1-12404, Rept. NASA CR-132520, ARFR-66, 30p., Feb. 1974. NTIS: N74-33865

A prototype gas filter correlation nondispersive infrared analyzer for determining ambient gaseous hydrogen chloride concentrations is described. The infrared source is an automotive-type cigarette lighter which is encased in a ceramic housing and resistance heated to about 1000 K. Radiation transmitted by a rotating chopper assembly is passed through a 100 cm sample cell and is collected along with radiation from an interference filter by a cone which in turn reflects the radiation onto a temperature stabilized lead-selenium detector. The analyzer possesses a root mean square noise equivalent concentration of 0.06 ppm HCl while maintaining an electronically determined 10-90% time response to gas samples of about 2 sec. No measurable response is observed for species such as carbon dioxide, carbon monoxide, and water; adequate rejection of hydrocarbon is also achieved. The span stability of the gas filter correlation analyzer is unaffected by the presence of water vapor. The only practical limitation of the instrument is an excessive zero drift which is produced by the simultaneous condensation of water and HCl on the walls of the sample cell. The sampler is designed for airborne measurements of trace quantities of HCl.

51547

APTIC NO. 75183

Zakak, A., R. Siegel, J. McCoy, S. Arab-Ismaïl, J. Porter, L. Harris, L. Forney, and R. Lisk

PROCEDURES FOR MEASUREMENT IN STRATIFIED GASES. VOLUME I (FINAL REPORT). Abcor Inc., Cambridge, Mass., Walden Research Div., Environmental Protection Agency Contract 68-02-1306, Program Element 1AB013, ROAP 21ACX-092, Rept. EPA-650/2-74-086-a, 276p., Sept. 1974. 55 refs.

NTIS: PB 241 837/AS

A literature search, laboratory experiments, and field tests were performed to develop methods for the continuous extraction of representative gas samples from stratified streams. A representative sample is one which permits the accurate deduction of a gaseous pollutant emission or mass flow through a test section. Although gas stratification exists, it appears to be less general and less severe than particulate stratification. A preliminary gas concentration survey must be made for a given gas stream to determine the existence of spatial stratification. There are two methods for obtaining representative gas samples where stratification exists. Where conditions permit, a system of monitoring the ratio of such pollutants as sulfur dioxide and nitrogen oxides to carbon dioxide from a single location is recommended; from the mea-

sured fuel flow and chemistry of the process, the mass flow of CO₂ is the mass flow of the pollutant. A schedule of manual surveys and the installation of a multi-element proportional sampler and a gas velocity array are recommended where conditions do not allow for a system of the former type. Passive mixing devices are unlikely to be useful due to practical difficulties in retrofitting high pressure drop devices to existing boiler duct work. An active mixing device using a jet of flue gas was theoretically examined and appears to be promising. (Author conclusions modified)

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APTIC NO. 75184

Zakak, A., R. Siegel, J. McCoy, S. Arab-Ismaïl, J. Porter, L. Harris, L. Forney, and R. Lisk

PROCEDURES FOR MEASUREMENT IN STRATIFIED GASES. VOLUME II, APPENDICES (FINAL REPORT). Abcor, Inc., Cambridge, Mass., Walden Research Div., Environmental Protection Agency Contract 68-02-1306, Program Element 1AB013, ROAP 21ACX-092, Rept. EPA-650/2-74-086-b, 213p., Sept. 1974.

NTIS: PB 241 838/AS

Methods for the continuous extraction of representative gas samples from gas streams that exhibit compositional stratification are outlined in a series of appendices. Topics covered include: automatic isokinetic sampling systems, arrays and mechanical traversing systems, diffusion tube sampling, temperature stabilized diffusion tubes, tracer methods, thermal null probes, velocity and concentration profiles, the effect of jet impingement on mixing in a gas stream, jet mixing in a duct, combustion and material balance calculations, and a computer program for analytical simulation of procedures for velocity and emission measurements in stratified stack gases (theory and user manual).

51549

APTIC NO. 75268

DETERMINATION OF DUST CONTENT OF GASES.

(Opredeleniye zaplyennosti gazov). In: Development of Methodology and Establishment of Efficiency of Industrial Dust Collection Equipment for Fine Particulate. U. S./USSR Working Group on Stationary Source Air Pollution Control Technology. U. S./USSR Environmental Agreement, Proj. A-4, Task 1, p. 1-77, Sept. 1974. Translated from Russian, 77p. (Entire report of TR 104-75 processed under APTIC 70040.)

Methods for the determination of the weight concentration of dust in flue gases are described along with methods for determining fog concentrations resulting from the condensation of vapors of inorganic acids. Topics covered include: the selection of the gas sampling location, isokinetic sampling using simple intake tubes, the operation of intake tubes at equilibrated static heads (zero-type tubes), external versus internal filtration, and various types of filter materials and sampling equipment. For the collection of fog, methods other than those employed for dusts must be used since most filter materials are either destroyed or inconvenient to use. Examples of fog collection methods include the gas bubbling method and fog trapping by hygroscopic cotton.

51550

APTIC NO. 75273

DETERMINATION OF ACTUAL DUST DENSITY.

(Opredeleniye istinnoy plotnosti pyli). In: Development of Methodology and Establishment of Efficiency of Industrial Dust Collection Equipment for Fine Particulate. U. S./USSR Working Group on Stationary Source Air Pollution Control Technology. U. S./USSR Environmental Agreement, Proj. A-4, Task 1, p. 1-30, Sept. 1974. Translated from Russian, 30p. (Entire report of TR 104-75 processed under APTIC 70040.)

Methods for the determination of various dust particle parameters are reviewed. Techniques covered include: dust density

determinations (pycnometric and manometric methods); particle size analysis (sieve analysis and sedimentation); and specific surface measurement (air permeability). The manometric method of density determination is more acceptable than the pycnometric method since the complete removal of air from the half-closed pores of the powder being studied is difficult in the latter method. The comparative characterization of particle size by specific surface determination is useful for fine particles (1-2 micron) which do not lead themselves to methods of direct size determination.

1973

51551

APTIC NO. 73744

Acton, L. L., EE. RR. Bartle, M. Griggs, G. D. Hall, W. D. Hesketh, C. B. Ludwig, W. Malkmus, and H. Reichle

GLOBAL MEASUREMENTS OF AIR POLLUTION FROM SATELLITES. *World Meteorological Organization, Geneva (Switzerland) and World Health Organization, Geneva (Switzerland), World Meteorol. Organ./World Health Organ. Tech. Conf. Observ. Meas. Atmos. Pollut., Helsinki, Finland, 1973, p. 434-442, WMO-368. 9 refs. (July 30-Aug. 4, Paper N75 11521.)*

NTIS: N75-11476-540

A multi-pollutant remote sensor for use aboard satellites is described. The sensor is based on gas filter correlation which is a modification of the nondispersive infrared technique. The radiation received by the sensor is chopped so that it alternately passes through two optical paths, one through a cell containing the specific gas and one transparent. Thus the radiation is modulated only at the wavelengths at which the pollutant absorbs. The instrument contains 10 similar optical trains, two for each of the pollutant species methane, sulfur dioxide, ammonia, and aerosols and one for each of the pollutants carbon monoxide and nitrogen dioxide. Each optical train, with the exception of the two aerosol channels, contains three data channels. Calculated values of the noise-equivalent radiance are presented for CO, CH₄, NO₂, SO₂, and NH₃.

51552

APTIC NO. 73731

Aleksandrov, N. N., S. A. Konkov, and G. S. Gunija

METHODS FOR THE AUTOMATIC RECORDING OF ATMOSPHERIC DUST CONCENTRATIONS AND SOME OF THE RESULTS OBTAINED. *World Meteorological Organization, Geneva (Switzerland) and World Health Organization, Geneva (Switzerland), World Meteorol. Organ./World Health Organ. Tech. Conf. Observ. Meas. Atmos. Pollut., Helsinki, Finland, 1973, p. 257-264, WMO-368. 8 refs. (July 30-Aug. 4, Paper N75 11502.)*

NTIS: N75-11476-540

Radiometric and photometric methods for automatically recording atmospheric dust concentrations were investigated. A photometric method, with the sampling device separated from the recorder to reduce temperature and humidity effects, was suitable for semi-automated analysis with gravimetric calibration. Radiometric measurements showed good agreement with results obtained with a microanalytical balance. Beta radiation attenuation depended very little on the composition of the absorbent. The sensitivity of the method was 0.1 mg/sq cm. Radiometric measurements appear fully capable of replacing gravimetric methods since the former are no less accurate or sensitive and are much quicker.

51553

APTIC NO. 73726

Altshuller, A. P.

MEASUREMENT OF GASEOUS AND PARTICULATE POLLUTANTS ON URBAN AND REGIONAL SCALES. *World Meteorological Organization, Geneva (Switzerland) and World Health Organization, Geneva (Switzerland), World Meteorol. Organ./World Health Organ. Tech. Conf.*

Observ. Meas. Atmos. Pollut., Helsinki, Finland, 1973, p. 162-175, WMO-368. 18 refs. (July 30-Aug. 4, Paper N75 11493.)

NTIS: N75-11476-540

The measurement of gaseous and particulate air pollutants on urban and regional scales is discussed. Topics covered include: reference methods for the analysis of total suspended particulates, sulfur dioxide, carbon monoxide, photochemical oxidants (ozone), hydrocarbons, and nitrogen dioxide; site selection for monitoring networks; monitoring problems involved in regional air quality assessment; and special considerations involved in the utilization of community monitoring for health and welfare studies. Improvements are in progress on manual and instrumental methods for monitoring particulates, hydrocarbons, and nitrogen dioxide; and some criteria for siting based on differences in sources of emissions and on atmospheric transport and chemical reactions are now developed. Nonurban monitoring poses special problems in terms of the limiting sensitivities of analytical techniques, and in regional studies biosphere emission levels must be adequately known to properly differentiate between man-made and natural contributions to air quality.

51554

APTIC NO. 73871

Andreasson, Kenth and Bengt Steen

DEPOSITION OF AMBIENT AIR PARTICLES IN TUBES OF 4.5-6.5 MM DIAMETER AT FLOW RATES OF 1.4 AND 3 L/MIN. *Swedish Water and Air Pollution Research Lab., Gothenburg (Sweden), Rept. B 129, 23p., Sept. 1973. 7 refs.*

Tubing parameters affecting the loss of particles between the sampling probe and filter of collection devices were examined for flow rates of 1.4 and 3 l/min and tube diameters of 4.5 and 6.5 mm. Tube length and material were the principal parameters affecting particle deposition; larger particles were more severely affected than smaller ones. Particle deposition was not affected by tube diameter, the tube bending radius, or the orientation of the tube. Electrostatic forces accounted for the effect of tube material on particle deposition rate.

51555

APTIC NO. 73737

Axelrod, H. D., A. F. Wartburg, R. J. Teck, M. D. LaHue, M. Campbell, and J. P. Lodge, Jr.

A SYSTEM FOR BACKGROUND AND REGIONAL MONITORING. *World Meteorological Organization, Geneva (Switzerland) and World Health Organization, Geneva (Switzerland), World Meteorol. Organ./World Health Organ. Tech. Conf. Observ. Meas. Atmos. Pollut., Helsinki, Finland, 1973, p. 346-353, WMO-368. (July 30-Aug. 4, Paper N75 11511.)*

NTIS: N75-11476-540

A system for background and regional monitoring of air pollution is described. A fixed-gas sampling module collects four samples of air in glass cylinders, with the cylinder for each sample being flushed for 20 min and then sealed. The cylinders are sent to a central laboratory for analysis by gas chromatography. Presently nitrous oxide and fluorinated hydrocarbons are being determined. Another module for reactive gases uses small pumps to provide an air flow rate of 200 ml/min through each sampling train. Screw-capped fritted bubblers contain liquid sampling media for ammonia, sulfur dioxide, nitrogen dioxide, and, after oxidation, nitric oxide. Hydrogen sulfide is collected by a dry chemically impregnated filter paper. Each sampling device is preceded by a Nuclepore prefilter.

51556

APTIC NO. 74291

Baulescu, G. and P. Marcuta

METHYL VIOLET - A REAGENT FOR THE DETERMINATION OF SULFUR DIOXIDE IN THE ATMOSPHERE. (*Metil violetul-reactiv pentru determinarea bioxidului de sulf din atmosfera*). *Text in Romanian. Rev. Chim., 24(11):912-915, 1973. 8 refs.*

The use of methyl violet as a reagent for the spectrophotometric determination of sulfur dioxide in the atmosphere is discussed. Methyl violet is as sensitive as the West and Gaeke method, gives a rapid indication, and is little influenced by nitric oxides. Ligand spectra were measured by a Spekol spectrophotometer water and ligand solutions without sulfur dioxide were used as controls. The following quantities were selected for determinations: 1.3 units of pH (0.75 ml % buffer potassium chloride 1/10/25ml volume of test solution); 1.0 ml dye; and 0.3% formaldehyde, i.e., 0.75 ml of 10% formaldehyde/25 ml, at 590 nm maximum absorption. The reagent was prepared by mixing 40 ml dye (0.1% solution) with 30 ml of 5% buffer potassium chloride solution in hydrochloric acid 1/10 and 30 ml of 10% ml formaldehyde solution. The reagent was left to stand for 30 min of stabilization. For each 25 ml of solution, 2.5 ml were taken, and readings were made 5 to 15 min after preparing the solution. The Lambert Beer Law was verified. The procedure involved adding 2.5 ml reagent, stabilizing the solution for 5 min, and adding 0.5 ml sodium nitrogen oxide (1 M). The spectrophotometric determination was made at 605 nm. Readings can be compared to water or other controls in 25 min, the time necessary for stabilization of both compound and control solution.

51557

APTIC NO. 73741

Bertolaccini, A. and S. Cerquiglini Monteriolo

COMPARATIVE STUDIES ON SEVERAL METHODS FOR THE DETERMINATION OF NITROGEN OXIDES IN AIR. *World Meteorological Organization, Geneva (Switzerland) and World Health Organization, Geneva (Switzerland), World Meteorol. Organ./World Health Organ. Tech. Conf. Observ. Meas. Atmos. Pollut., Helsinki, Finland, 1973, p. 404-412, WMO-368. 2 refs. (July 30-Aug. 4, Paper N75 11518.)*

NTIS: N75-11476-540

The Saltzman colorimetric technique was compared with a chemiluminescent technique for measuring nitrogen oxides in air. Samples of standard gas were used for the intercomparison tests. The Saltzman manual method and the chemiluminescent method were in acceptable agreement for NOx (mean ratio 1:13). The same applied to the nitric oxide mean ratio, while the nitrogen dioxide mean ratio was somewhat higher (1.33). The mean ratio between automatic and manual Saltzman methods was 1.14. Overall, there was acceptable agreement between the methods tested. The performance of the automated Saltzman technique, however, required more operator attention than the chemiluminescent monitor.

51558

APTIC NO. 73951

Bolle, H. J.

SPECTRAL SIGNATURES OF MINOR ATMOSPHERIC CONSTITUENTS AND EXPERIMENTAL POSSIBILITIES TO USE THEM FOR POLLUTION MONITORING. *In: The Implications for European Space Programmes of the Possibilities of Manned Missions, III. Atmospheric Sciences, European Space Research Organization, Alpbach (Austria), Summer School, 1973. 99 refs.*

NTIS: N74-33347

The use of spectrophotometric remote sensing techniques, including tunable lasers, for the monitoring of atmospheric pollution is discussed. Topics covered include: the nature of the spectral signatures of gases; principles of quantitative gas-constituent observation (the Inversion Theorem and the Spectral Correlation Principle); various observation techniques, including emission measurements and occultation techniques; the detection of individual gaseous components such as carbon dioxide, water vapor, ozone and oxidants, carbon monoxide, nitrogen oxides, sulfur dioxide, hydrogen sulfide, hydrocarbons, and free radicals of the alkyl and hydroxyl type; the monitoring of particulate matter; and the principles of instrumentation used for remote sensing.

51559

APTIC NO. 73730

Bravo, H. A., A. C. Lowe, and S. Salazar

IMPORTANCE OF THE APPLICATION OF ADEQUATE TECHNOLOGY IN THE ELIMINATION OF SUSPENDED PARTICLES AS A PARAMETER OF AIR QUALITY. *(La importancia del uso de tecnología adecuada en la estimación de partículas suspendidas como parametro de calidad de aire). Text in Spanish. World Meteorological Organization, Geneva (Switzerland) and World Health Organization, Geneva (Switzerland), World Meteorol. Organ./World Health Organ. Tech. Conf. Observ. Meas. Atmos. Pollut., Helsinki, Finland, 1973, p. 249-256, WMO-368. 6 refs. (July 30-Aug. 4, Paper N75 11501.)*

NTIS: N75-11476-540

Correct evaluation of suspended particles in the air is one of the parameters which determines air quality. However, available technologies are not interchangeable among different areas of the world. Two useful methods which test for different factors in air quality are reflection and gravimetry. Smoke levels can be measured by reflection tests which evaluate air as to suspended particles, based on collection by filter paper. The concentration on the surface of the filter paper is linearly proportional to the volume of the filtered air sample. The Environmental Protection Agency measured pollen in the air between April and May with a gravimeter and obtained good results. The gravimeter is also suited to measure hydrocarbons from incompletely burned combustibles. Correlation of different methods for determining air quality is stressed.

51560

APTIC NO. 73672

Brewer, Lial W.

GAS CHROMATOGRAPHY. *In: The Industrial Environment - Its Evaluation and Control. Washington, D. C., Government Printing Office, 1973, Chapt. 21, p. 257-276. 46 refs.*

GPO

The principles, operating parameters, and applications of gas chromatography are discussed. Topics covered include: the sample injection system, column construction, adsorbents used as column packings, different detector types, sample preparation, operating parameters, and the presentation of chromatographic data. Two-section columns are capable of determining nitrogen dioxide down to 200 ppm. Other applications include the analysis of human breath for exposure to organic solvents, the detection of carbon tetrachloride in typewriter cleaner, the detection of benzene in gasoline, and the assay of chlorinated hydrocarbons in mixtures.

51561

APTIC NO. 73734

Brownscombe, J. L., M. R. Porter, and P. Goldsmith

A CRITICAL APPRAISAL OF THE PERFORMANCE OF THE AIR SAMPLING EQUIPMENT USED IN THE EUROPEAN AIR SAMPLING NETWORK. *World Meteorological Organization, Geneva (Switzerland) and World Health Organization, Geneva (Switzerland), World Meteorol. Organ./World Health Organ. Tech. Conf. Observ. Meas. Atmos. Pollut., Helsinki, Finland, 1973, p. 297-306, WMO-368. 7 refs. (July 30-Aug. 4, Paper N75 11506.)*

NTIS: N75-11476-540

Laboratory and field experiments were performed to assess the performance of air sampling bubblers used in the European Air Sampling Network, with particular emphasis on aerosol sampling efficiency. Experiments with artificial sodium chloride aerosols demonstrated that for usual sampling conditions in the field only particles smaller than 4 micron in diameter are efficiently collected by the sampling system. Double-bubbler field experiments revealed that a large fraction of the total mass of particles actually collected were in the size range of 0.2 micron; these particles were not retained by the first

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bubbler. Thus, the air sampling equipment used in the European Network appears to underestimate the air concentration of particulate material by more than 50%.

51562

APTIC NO. 73735

Bruner, Fabrizio and Paolo Ciccioli

MONITORING OF CO, SO₂, AND HC IN AIR BY GAS CHROMATOGRAPHY. World Meteorological Organization, Geneva (Switzerland) and World Health Organization, Geneva (Switzerland), World Meteorol. Organ./World Health Organ. Tech. Conf. Observ. Meas. Atmos. Pollut., Helsinki, Finland, 1973, p. 324-333, WMO-368. 6 refs. (July 30-Aug. 4, Paper N75 11509.)

NTIS: N75-11476-540

Improvements in gas chromatographic procedures for the measurement of ambient carbon monoxide, sulfur dioxide, and hydrocarbons are outlined. An improved column for CO determinations was achieved by packing a 2-meter column with molecular sieve 5A (72-85 mesh sieves), provided that the column diameter was 0.5 cm. The latter parameter was critical both in relation to the sample size and the flow rate to the helium detector. The detection limit for CO with this column was 50 ppb. A column made of graphitized carbon black treated with hydrogen at 100 C to purge traces of sulfur and oxygen and coated with 0.7% GEXE 60 and 0.7% phosphoric acid permitted the detection of SO₂ at the 15 ppb limit. Elution time was about 2 min. An apparatus for the simultaneous monitoring of total hydrocarbons and methane was devised using a dual detector system which detects the total amount of organics by flame ionization detection and methane by a column operated at room temperature and a flow rate of 40 ml/min. The column was packed with 40-60 mesh Porapak Q.

51563

APTIC NO. 73671

Bumsted, H. E.

SPECTROPHOTOMETRY. In: *The Industrial Environment - Its Evaluation and Control*. Washington, D. C., Government Printing Office, 1973, Chapt. 19, p. 223-246. 14 refs. GPO

The principles and applications of various spectrophotometric methods are discussed. Visible spectrophotometry can be used for determining airborne lead, iron, manganese, arsenic, chromium, aldehydes, sulfates, and chlorides. Ultraviolet spectrophotometry is useful for the determination of various aromatic and polynuclear hydrocarbons, as well as airborne mercury. Fixed gases such as carbon monoxide, sulfur dioxide, and ammonia can be determined directly by infrared spectrophotometry, though the technique requires relatively large air sample volumes. Alpha quartz in respirable air samples can also be determined by infrared techniques. Fluorescence spectrophotometry is particularly valuable for determining beryllium in airborne particulates and the polynuclear aromatic hydrocarbon content of effluents from combustion processes. Atomic absorption spectrophotometry offers a very sensitive method for the analysis of many metals; several attachments for atomic absorption spectrophotometers are available for the determination of mercury in particulate material and other matrices.

51564

APTIC NO. 73943

Ebeling, D. and G. Kuper

ADVANCED TECHNOLOGIES FOR POLLUTANT DETECTION SYSTEMS. Preprint, IMPULSPHYSIK GmbH, Hamburg (West Germany), 16p., 1973(?).

Improvements in Raman lidar remote sensing systems are described. Detection of sulfur dioxide and carbon dioxide in the range of a few to 100 ppm at considerable distances is possible by increasing the laser power to 500 MW, increasing the lens speed and quantum efficiency, and reducing the divergence. The optical system improvements are achieved by replacing a Cassegrainian system with a Leitz projection lens. The insertion of total internal reflection light guides in the

multiplier entrance window results in a quantum efficiency improvement of about four for regions of low efficiency. A multichannel image converter allows for the simultaneous observation of different Raman lines with a single measuring procedure, thus reducing the measuring time for one line from 20 min to about 1 min for several lines. Examples are illustrated for two lines corresponding to nitrogen and oxygen.

51565

APTIC NO. 73667

Fraser, David A.

SIZING METHODOLOGY. In: *The Industrial Environment - Its Evaluation and Control*. Washington, D. C., Government Printing Office, 1973, Chapt. 14, p. 155-165. 29 refs. GPO

Techniques and equipment used in sizing airborne particulates are discussed. Topics covered include: statistical considerations dealing with particle size distributions; specimen preparation for optical microscopic examination; calibration procedures; and techniques for specialized sampling applications involving the use of electron microscopes, impaction devices, centrifugal collectors, light scattering measurements, and electrical charge measurements. Although the standard method for particle size analysis with the optical microscope is usually adequate to describe the health implications of airborne particulates, special applications may require more sophisticated equipment. Smoke and fume particles may lie below the limit of resolution of the optical system, or continuous using automated instrumentation and an immediate readout may be desired.

51566

APTIC NO. 73745

Fraser, Robert S.

MEASUREMENT OF ATMOSPHERIC PARTICLES FROM SATELLITES. World Meteorological Organization, Geneva (Switzerland) and World Health Organization, Geneva (Switzerland), World Meteorol. Organ./World Health Organ. Tech. Conf. Observ. Meas. Atmos. Pollut., Helsinki, Finland, 1973, p. 443-454, WMO-368. 9 refs. (July 30-Aug. 4, Paper N75 11522.)

NTIS: N75-11476-540

Satellite measurements of aerosol characteristics are discussed. Measured radiances over the Atlantic Ocean obtained with the Earth Resources Technology Satellite-1 are presented and illustrate that satellite instruments are capable of measuring radiances with sufficient relative accuracy to derive particle characteristics. However, except for a few beginning attempts to relate the total mass of particulates in a column to the measured radiance, methods for deriving particle characteristics from satellite measurements are not yet developed. Absolute radiance can not be measured with sufficient accuracy at the present time.

51567

APTIC NO. 73670

Freiser, Henry

SEPARATIONS PROCESSES IN ANALYTICAL CHEMISTRY. In: *The Industrial Environment - Its Evaluation and Control*. Washington, D. C., Government Printing Office, 1973, Chapt. 18, p. 207-222. 16 refs. GPO

The principles and practices of two-phase separation processes in analytical chemistry are discussed, with particular emphasis on solvent extraction and ion exchange procedures. Solvent extraction is used widely for rapid, cleanout separations of trace level quantities of analytically desired elements and compounds from biological and environmental samples; while ion exchange is extremely valuable for separating fractional part per million concentrations of interfering chemical elements from one another to increase the specificity, accuracy, and sensitivity of their final method of estimation. Solvent extraction is based on the principle that a solute of interest transfers from one solvent into a second which is essentially immis-

cible with the first. Ion exchange is a process in which ions of the same sign are exchanged between a solution and an immobilized phase which consists of macromolecular species having many ionizable functional groups, called exchange sites. Other separation processes include various types of chromatography, electrophoresis, electrodialysis, fractional distillation, zone refining, and thermal diffusion.

51568

APTIC NO. 73748

Frøehlich C. and H. Quenzel

INFLUENCE OF THE SUN'S AUREOLE ON THE DETERMINATION OF TURBIDITY. *World Meteorological Organization, Geneva (Switzerland) and World Health Organization, Geneva (Switzerland), World Meteorol. Organ./World Health Organ. Tech. Conf. Observ. Meas. Atmos. Pollut., Helsinki, Finland, 1973, p. 538-544, WMO-368, 9 refs. (July 30-Aug. 4, Paper N75 11530.)*

NTIS: N75-11476-540

Computations for different aerosol models are presented to demonstrate the influence of the photometer acceptance angle and thus the received intensity of a sun's aureole on turbidity determinations made with a Volz-type sunphotometer. The acceptance geometry introduces uncontrollable errors if the maximum viewing angle is too large, and a reduction of this angle to about 1.5 deg is suggested as a compromise between a tolerable error and the possibility of aiming the instrument by hand. The following view-limiting geometry is proposed: a front aperture of 0.6 cm, a receiver aperture of 0.2 cm, and an interaperture distance of 15 cm.

51569

APTIC NO. 73722

Gentilizza, M., M. Fugas, and F. Valc

EVALUATION OF THE ACIDIMETRIC HYDROGEN PEROXIDE METHOD FOR MEASURING SULPHUR DIOXIDE IN AIR. *World Meteorological Organization, Geneva (Switzerland) and World Health Organization, Geneva (Switzerland), World Meteorol. Organ./World Health Organ. Tech. Conf. Observ. Meas. Atmos. Pollut., Helsinki, Finland, 1973, p. 89-96, WMO-368, 4 refs. (July 30-Aug. 4, Paper N75 11486.)*

NTIS: N75-11476-540

The acidimetric hydrogen peroxide method for measuring airborne sulfur dioxide was evaluated against a specific method for the determination of sulfate originating from SO₂ to assess the accuracy of the former method in the face of other airborne acid interferences. The acidimetric method gave predominantly higher results during the winter heating season and lower results during the summer. The two methods were in very good agreement, however, during intermediate periods. Although the difference in results obtained by the two methods was considerable on certain days, monthly averages were in fair agreement. Yearly averages were in good agreement. Thus, where measures of central tendency rather than single values are evaluated and compared, the acidimetric method yields a satisfactory estimation of the atmospheric SO₂ concentration.

51570

APTIC NO. 73750

Goto, K., T. Tsuji, Y. Higuchi, and H. Kimura

OBSERVATIONS OF ATMOSPHERIC TEMPERATURE INVERSION LAYERS USING A 100 PPS G.P. YAG LASER RADAR CAR. *World Meteorological Organization, Geneva (Switzerland) and World Health Organization, Geneva (Switzerland), World Meteorol. Organ./World Health Organ. Tech. Conf. Observ. Meas. Atmos. Pollut., Helsinki, Finland, 1973, p. 557-566, WMO-368, 8 refs. (July 30-Aug. 4, Paper N75 11532.)*

NTIS: N75-11476-540

A 100 pulse/sec mobile YAG laser radar was used to observe temperature inversions and aerosol patterns over an urban area. The diffusing process of suspended particulates was ob-

served when a transition area was disturbed by a breeze (2-3 m/sec). A high density layer disappeared when the wind velocity exceeded 10 m/sec. Stratified smog layers were observed over several buildings. Suspended particulates from traffic appeared to creep along the ground rather than diffuse upwards. The laser was very effective in detecting inversion layers and observing particulate patterns over the city.

51571

APTIC NO. 74228

Gower, Donald E.

AIR MONITORING METHODS AND INSTRUMENTATION PERFORMANCE EXPERIENCES IN THE NEW YORK STATE CONTINUOUS AIR MONITORING SYSTEM. *Air Pollution Control Assoc., Pittsburgh, Pa., Mid-Atlantic States Section, 17p., 1973. (Presented at the Air Pollution Control Association, Mid-Atlantic States Section, Technical Conference, May 18, 1973, Paper BAQS-47.)*

Experience with continuous air monitoring methods and instrumentation used in the New York State continuous air monitoring system is discussed, with particular emphasis on quality assurance. Pollutants being monitored include sulfur dioxide, hydrogen sulfide, mercaptans, carbon monoxide, oxidants, ozone, and nitrogen dioxide. Calibration, operation, and maintenance are discussed for colorimetric methods, coulometric devices, flame photometers, gas chromatographic systems, non-dispersive infrared units, and chemiluminescence techniques. Comparative data are illustrated for measurements of a given pollutant with different methods.

51572

APTIC NO. 74033

Hay, D. R.

RECENT STUDIES OF VISIBILITY AND ATMOSPHERIC ATTENUATION AT OPTICAL WAVELENGTHS. *Preprint, North Atlantic Treaty Organization, Paris (France), 4p., 1973, 23 refs. (Presented at the North Atlantic Treaty Organization Advanced Study Institute, Sorrento, Italy, June 5-14, 1973.)*

Developments in optical radiometry are reviewed, with particular emphasis on visibility measurements and the atmospheric attenuation at optical wavelengths of 0.3-0.7 micron. The intensity of an optical wave passing through the atmosphere is seen to be an exponential function of the atmospheric turbidity, and the extinction coefficient of the medium varies widely over the range of optical wavelengths and atmospheric conditions. Representative optical extinction coefficients range from 0.00016/m for pure air to 0.0005/m for particulate pollution (5 times 10 to the 10 particles/cu m), 0.0005/m for haze, 0.01/m for fog, 0.16/m for clouds, and 0.0015/m for rain (20 mm/hr). Laser radar offers the potential for measuring the extinction profiles through the atmosphere. Optical scintillation offers a means for directly relating fluctuations in refractivity to temperature fluctuations in the air turbulence. Measurements of the average transverse wind along an optical path may also be obtained with optical scintillation.

51573

APTIC NO. 73953

Houghton, J. T.

REMOTE SOUNDING - INTRODUCTION. *In: The Implications for European Space Programmes of the Possibilities of Manned Missions. III. Atmospheric Sciences, European Space Research Organization, Alpbach (Austria), Summer School, 19p., 1973, 12 refs.*

NTIS: N74-33347

The application of satellite-borne remote sensing techniques for measuring meteorological parameters and atmospheric pollution is discussed. Current applications include the use of visible and infrared imagery for cloud mapping, the remote sounding of temperature profiles, measurements of the earth's radiation budget, the observation of emissions from water vapor bands, and the measurement of atmospheric ozone

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levels. Instruments are currently being developed to observe at much greater horizontal and vertical resolution and to observe the distribution of important minor constituents such as nitric oxide and nitrogen dioxide in the stratosphere. Remote sensing techniques can be used to observe any part of the electromagnetic spectrum from the far ultraviolet to the microwave radio region.

51574

APTIC NO. 73746

Hoyt, Douglas V. and Gary A. Herbert

GROUND-BASED MEASUREMENTS OF SOLAR RADIATION BY GEOPHYSICAL MONITORING FOR CLIMATIC CHANGE (U.S.A.). World Meteorological Organization, Geneva (Switzerland) and World Health Organization, Geneva (Switzerland), World Meteorol. Organ./World Health Organ. Tech. Conf. Observ. Meas. Atmos. Pollut., Helsinki, Finland, 1973, p. 506-515, WMO-368, 10 refs. (July 30-Aug. 4, Paper N75 11527.)

NTIS: N75-11476-540

The Geophysical Monitoring for Climatic Change program is described in relation to its ground-based measurements of solar radiation. A multichannel pyrheliometer is the primary solar radiation monitoring instrument. Several wavelength bands in the visible spectrum are available for turbidity calculations. Calibration is performed by comparing the voltage output with the sun as a source to the irradiance value provided by an absolute calibration instrument. Observations of both direct and diffuse solar radiation are being made in four wavelength bands using domes made of quartz and Schott glasses. Determinations of the Angstrom turbidity coefficients which are indicative of the aerosol loading and size distribution are being made along with measurements of total precipitable water, total radiation, and cloud cover.

51575

APTIC NO. 73754

Hughes, E. E. and J. K. Taylor

ACCURATE GAS STANDARDS FOR AIR POLLUTION ANALYSES. World Meteorological Organization, Geneva (Switzerland) and World Health Organization, Geneva (Switzerland), World Meteorol. Organ./World Health Organ. Tech. Conf. Observ. Meas. Atmos. Pollut., Helsinki, Finland, 1973, p. 616-628, WMO-368, (July 30-Aug. 4, Paper N75 11537.)

NTIS: N75-11476-540

The development of accurate gas standards for air pollution analyses is discussed. A gaseous standard reference material or device must possess three qualities: accuracy, stability, and ready availability. Standards consisting of propane in air and carbon dioxide in nitrogen are already available as are sulfur dioxide permeation tubes. Some progress is being made in preparing standard reference materials consisting of nitric oxide in nitrogen but definite problems remain that are associated principally with stability. The only practical means of preparing calibration mixtures of air and nitrogen dioxide at low concentrations is by the use of permeation tubes. Mechanically, these tubes are stable and can survive temperatures above 40 C, although there is some evidence that exposure to elevated temperature for more than 8 hr may permanently change the permeation rate.

51576

APTIC NO. 73756

Johnson, D. A. and D. H. F. Atkins

A TECHNIQUE FOR MEASUREMENT OF SULPHUR DIOXIDE AND SULPHATE CONCENTRATIONS FROM AN AIRCRAFT. World Meteorological Organization, Geneva (Switzerland) and World Health Organization, Geneva (Switzerland), World Meteorol. Organ./World Health Organ. Tech. Conf. Observ. Meas. Atmos. Pollut., Helsinki, Finland, 1973, p. 216-222, WMO-368, 4 refs. (July 30-Aug. 4, Paper N75 11598.)

NTIS: N75-11476-540

A method for the simultaneous determination of sulfate aerosol and sulfur dioxide concentrations from an aircraft is presented. The method consists of a filtration system that employs a reciprocating diaphragm air pump. Filter paper of suitably low sulfate background (Whatman 41) is impregnated with a solution of 25% (weight/volume) analytical reagent grade potassium carbonate in 10% glycerol solution. The analysis for sulfur dioxide and sulfates is performed with a Technicon Autoanalyzer. The lower limit of detection is 2-3 micrograms/cu m or less, and sampling can be performed over distances of 40 km or more.

51577

APTIC NO. 73669

Keenan, Robert G.

DIRECT READING INSTRUMENTS FOR DETERMINING CONCENTRATIONS OF AEROSOLS, GASES AND VAPORS. In: *The Industrial Environment - Its Evaluation and Control*. Washington, D. C., Government Printing Office, 1973, Chapt. 16, p. 181-195, 13 refs.

GPO

Direct reading instrumentation for the monitoring of aerosols, gases, and vapors is discussed. Monitoring devices based on the following principles are described: aerosol photometry (light scattering), chemiluminescence, colorimetry, combustion, conductivity, coulometry, flame ionization, photometry, polarography, and radioactivity. A summary of the operating characteristics of commercially available (as of 1972) direct reading physical instruments is tabulated along with characteristics of detector tubes. Calibration procedures are also discussed.

51578

APTIC NO. 74137

Kleitzi, A.

APPLICATION OF ULTRA-RAPID HOLOGRAPHY FOR THE DETERMINATION OF THE SIZE AND SPEED OF PARTICLES IN A BIPHASAL FLOW. (*Application de l'holographie ultra-rapide a la determination de la taille et de la vitesse des particules dans un ecoulement diphasique*). Text in French. Houille Blanche, no. 8:677-687, 1973, 5 refs.

The use of ultra-rapid laser holography for determining the size, speed, and direction of aerosol particles is described. The aerosol particles are recorded on a sensitive photographic layer by means of parallel beams generated from a pulsed laser after their passage through the aerosol. Restoration of the laser picture is done by means of parallel light generated by a continuous laser, resulting in a real or conjugated picture. It is possible to record the speed and direction of high-speed aerosol particle motion by using double exposure techniques.

51579

APTIC NO. 73942

Kuper, G. and D. Ebeling

RAMAN LIDAR MEASUREMENTS IN SIMULATED POLLUTED ATMOSPHERES. Preprint, IM-PULSPHYSIK GmbH, Hamburg (West Germany), 6p., 1973 (?).

Laboratory and field measurements of various gaseous species were performed with a Raman lidar remote sensing device. Measurements of nitrogen, carbon dioxide, and oxygen were obtained in a test chamber 6 m long and 35 cm in diameter. The correspondence between calculated and measured values from filter measurements was unexpectedly good, although double monochromator values were only about 30% of the calculated values for N₂ and 40% for CO₂. Measurements on a stack plume (80 ppm sulfur dioxide) at a distances of 100 m gave 42 signal counts for 100 laser pulses. The noise under clear daytime sky conditions limited the measurements to night or twilight periods.

51580

APTIC NO. 73753

Levadie, Benjamin

COLLABORATIVE TESTING AND EVALUATION OF METHODS USED TO ASCERTAIN AIR QUALITY.

World Meteorological Organization, Geneva (Switzerland) and World Health Organization, Geneva (Switzerland), World Meteorol. Organ./World Health Organ. Tech. Conf. Observ. Meas. Atmos. Pollut., Helsinki, Finland, 1973, p. 604-615, WMO-368. 2 refs. (July 30-Aug. 4, Paper N75 11536.)

NTIS: N75-11476-540

Spiked samples of nitrogen dioxide, sulfur dioxide, airborne lead, airborne particulate matter, settling particulates (dust fall) and total sulfates obtained from three sites with the widest possible variation in trace component concentrations and conditions were subjected to collaborative analysis by five laboratories. The methods of analysis used were the Greiss/Saltzman procedure (NO₂), the West-Gacke/Kozlayeva procedure (SO₂), the colorimetric/dithizone procedure (Pb), the coefficient of haze procedure (airborne particulates), dust fall measurement (settleable particulates), and the lead peroxide candle test (total sulfation). The standard deviations recorded between labs for NO₂, SO₂, dust fall, and lead were 6 micrograms + 0.07/cu m, 6 micrograms + or - 0.09/cu m, 2.3 g/m³, and 0.18 micrograms + or - 0.04/m, respectively. Within-lab standard deviations were 2 micrograms + 0.03/cu m, 2 micrograms + or - 0.05, 1.6 g/m³, and 0.17 micrograms + or - 0.03/cu m, respectively. A standard deviation of 0.012 micrograms/sq cm/day was obtained for sulfation.

51581

APTIC NO. 73721

Liberti, A. and L. Zoccolillo

IMPROVED EVALUATION OF POLYCYCLIC HYDROCARBONS IN ATMOSPHERIC DUST BY GAS CHROMATOGRAPHY WITH GLASS BEADS COLUMNS. World Meteorological Organization, Geneva (Switzerland) and World Health Organization, Geneva (Switzerland), World Meteorol. Organ./World Health Organ. Tech. Conf. Observ. Meas. Atmos. Pollut., Helsinki, Finland, 1973, p. 79-88, WMO-368. 5 refs. (July 30-Aug. 4, Paper N75 11485.)

NTIS: N75-11476-540

A combination thin-layer/gas chromatographic procedure for the improved determination of polynuclear compounds in airborne particulate matter is described. Thin-layer chromatography of a cyclohexane extracted sample is first conducted, followed by gas chromatographic analysis with a high efficiency glass bead column pretreated with dodecylbenzene sulfonate and coated with Apiezon L. The chromatogram of an extract of particulate matter obtained in Rome, Italy contains about 60 peaks and reveals the presence of a large number of polynuclear compounds that are unidentified.

51582

APTIC NO. 73956

Lieberman, Alvin

SUB-MICRON PARTICULATE ANALYZER (FINAL REPORT). Royco Instruments, Inc., Menlo Park, Calif., California Air Resources Board Contract ARB 2066, Proj. ARB 3-046-1, Rept. ARB-R-2066-73-20, 24p., March 9, 1973. 3 refs.

NTIS: PB 236401

The feasibility of continuous condensation nuclei counter was demonstrated. The device consisted of a system for creating a supersaturated air stream combined with a conventional aerosol particle counter. Water and alcohol were investigated as condensing vapor sources over various temperature and vapor concentration ranges. The number of particles larger than 0.006 micron in diameter were measured in concentrations up to 3000/cu cm with no dilution required. Application studies with automobile exhaust indicated the possibility of using the analyzer for studying nuclei-producing reactions, possibly with real-time read-out. (Author abstract modified)

51583

APTIC NO. 73673

Linch, Adrian L.

QUALITY CONTROL FOR SAMPLING AND LABORATORY ANALYSIS. In: *The Industrial Environment - Its Evaluation and Control*. Washington, D. C., Government Printing Office, 1973, Chapt. 22, p. 277-297. 31 refs.

GPO

Quality control practices for sampling and laboratory analysis are reviewed. Topics discussed include: the detection and elimination of determinate error, the control of indeterminate error, the use of control charts to distinguish indeterminate variations from determinate variation, the construction and accuracy of quality control charts, various statistical tools used in quality control, and collaborative testing. Identification of the determinate sources of error provides the information required to reduce assignable error to a minimum level, and the remaining indeterminate errors then determine the precision of analyses produced by the procedure. Statistical techniques can be used to estimate efficiently the precision. Bias can be eliminated both within the laboratory and between laboratories by collaborative testing. The use of replicate determinations, spiked sample techniques, reference samples, standard samples, and quality control charts provides assurance that the procedure remains in control.

51584

APTIC NO. 73664

Lippmann, Morton

INSTRUMENTS AND TECHNIQUES USED IN CALIBRATING SAMPLING EQUIPMENT. In: *The Industrial Environment - Its Evaluation and Control*. Washington, D. C., Government Printing Office, 1973, Chapt. 11, p. 101-122. 15 refs.

GPO

Techniques and instruments used in calibrating air sampling equipment are reviewed. Topics covered include: the calibration of flow, volume, and collection efficiency; the use and reliability of standards and standard procedures; calibration techniques involving water displacement, spirometers, frictionless piston meters, dry-gas meters, positive displacement meters, rotameters, venturi meters, velocity pressure meters, bypass flow indicators, and heated element anemometers; mass flow and tracer techniques; the use of well characterized test atmospheres; the determination of sample stability and/or recovery; and the calibration of sensor response. In general, calibration is indicated whenever a device is changed, repaired, received from a manufacturer, subjected to use, mishandled, damaged, or of questionable accuracy. Enough points or different rates of flow must be obtained on a calibration curve to give confidence in the plot obtained, with each point being the result of more than one reading if possible. Calibration curves and factors must be properly identified as to conditions of calibration, device calibrated and standard calibrated against, units of calibration, range and precision of calibration, date, and the person performing the calibration.

51585

APTIC NO. 74257

Lucas, D. H. and W. L. Snowsill

THE MEASUREMENT OF DUST EMISSIONS. *Works Eng.*, 1973:13-17, March 1973. 2 refs.

Instruments designed for the monitoring of particulate emissions in stack releases are reviewed. Instruments which measure the optical density of flue gases are appropriate for monitoring fine dust and smoke (0.1-1 micron) but are unsuitable for measuring the emission of coarse dust, grit, and agglomerates. The measure which such instruments give is directly related to the visibility of the plume and is obtained by measuring the attenuation of a beam of light directed through the flue gas. An instrument for the measurement of coarser particulates (dust, grit, and agglomerates) is also available. This instrument uses a beam of light that is deflected by prisms to pass through the glass top and bottom of a collector box and is returned to a photocell to continu-

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ously measure dust which collects at the bottom of the collector box. A nozzle which is the entrance of the collector box samples the flue gas. It is generally necessary to install instruments both of the dust and grit type and the smoke measuring type for particulate monitoring of flue gases.

51586

APTIC NO. 74285

Lukomski, Hieronim

EXTRACTION OF ELECTRIC CHARGES FROM THE ATMOSPHERE. (*Ekstrakcja ładunków elektrycznych z atmosfery*). Text in Polish. *Acta Geophys. Polon.* (Warsaw), 21(2):131-137, Feb. 1973. 4 refs.

A method for extracting ions from a thin air stratum flowing by an electrode located at the opening of a highly sensitive electrometer is described. The electrode which is shaped like a small dish may be empty or may contain water or selective chemical absorbents of water vapor or oxygen. The device shows the existence of electrical space charges in a relatively small air volume and algebraically sums up the electric charges. Measurements conducted in fair weather during September and October 1971 in Poland indicate that sun radiation strongly influences air ionization and the distribution of space electrical charges in the atmosphere. Sudden powerful ionization of air by lightning in the presence of an intensified electrical field causes water fall from storm clouds.

51587

APTIC NO. 73752

McNeshy, James R.

STANDARD REFERENCE MATERIALS FOR AIR POLLUTION. *World Meteorological Organization, Geneva (Switzerland) and World Health Organization, Geneva (Switzerland), World Meteorol. Organ./World Health Organ. Tech. Conf. Observ. Meas. Atmos. Pollut., Helsinki, Finland, 1973, p. 595-603, WMO-368. (July 30-Aug. 4, Paper N75 11535.)*

NTIS: N75-11476-540

Standard reference materials available for air pollution measurements are reviewed. Permeation tubes are used for sulfur dioxide and nitrogen dioxide by the National Bureau of Standards since it is not possible to contain concentrations as low as those representative of ambient conditions in high pressure gas cylinders. A standard for ambient ozone is provided by an ultraviolet light source that dissociates oxygen flowing past a light source of ozone with the result formation of two molecules of ozone for each photon absorbed. A carbon monoxide ambient air standard reference material is undergoing final stability testing, and plans are underway for the development of an urban particulate standard. Compressed gas source standards are available for carbon dioxide in nitrogen at 1, 7.5 and 15 mol% and for propane in air at 3, 10, 50, 100, and 500 ppm. Under development are carbon monoxide in nitrogen and nitric oxide in nitrogen at concentrations appropriate to automobile exhaust.

51588

APTIC NO. 73733

Meszaros, E.

AIRCRAFT MEASUREMENTS OF THE CONCENTRATION AND SIZE DISTRIBUTION OF ATMOSPHERIC SULFATE PARTICLES. *World Meteorological Organization, Geneva (Switzerland) and World Health Organization, Geneva (Switzerland), World Meteorol. Organ./World Health Organ. Tech. Conf. Observ. Meas. Atmos. Pollut., Helsinki, Finland, 1973, p. 276-281, WMO-368. 8 refs. (July 30-Aug. 4, Paper N75 11504.)*

NTIS: N75-11476-540

A set of aircraft collectors designed to capture aerosol particles in three size ranges for subsequent sulfate analysis is described along with data on the size distribution of sulfate particles in the lower troposphere. The total population of atmospheric sulfates is collected on Microsorban filters by means of a portable Sartorius sampler. The filters are 16 cm in diameter and the sampling rate is about 8 cu m/hr. The larger

sized particles are captured via the inertia principle using rectangular collectors of 0.2 mm and 4 mm width. Samplings above inversions revealed that 75% of the sulfate was associated with aerosol particles smaller than 0.2 micron; at 500 m altitude, 48% of the sulfate mass was accounted for by particles with a radius less than 0.2 micron.

51589

APTIC NO. 73739

Ohta, S. and T. Ito

METHOD OF MEASUREMENT OF VERY LOW CONCENTRATIONS OF SUBMICRON AEROSOLS. *World Meteorological Organization, Geneva (Switzerland) and World Health Organization, Geneva (Switzerland), World Meteorol. Organ./World Health Organ. Tech. Conf. Observ. Meas. Atmos. Pollut., Helsinki, Finland, 1973, p. 387-393, WMO-368. 10 refs. (July 30-Aug. 4, Paper N75 11516.)*

NTIS: N75-11476-540

The use of a Pollak-type fully automatic nuclei counter for daily continuous measurements of submicron aerosols along with an Aitken-type semi-automatic photographic recording counter for calibration purposes is described. Measurements near the Ogasawara Islands and Marcus Island in the Pacific during the summers of 1970 and 1971 showed global background aerosol concentrations of between 150 and 250 nuclei/cc. The global background values exhibited very little time variability, about 10-20%. The particle counters used appeared to give sufficiently accurate data to be useful for global background studies.

51590

APTIC NO. 73668

Pagnotto, Leonard D. and Robert G. Keenan

SAMPLING AND ANALYSIS OF GASES AND VAPORS. In: *The Industrial Environment - Its Evaluation and Control*. Washington, D. C., Government Printing Office, 1973, Chapt. 15, p. 167-179. 38 refs.

GPO

Methods for the sampling and analysis of gases and vapors are discussed. Topics covered include: instantaneous or grab sampling versus integrated or continuous sampling; sampling criteria; the use of evacuated flasks and gas or liquid displacement collectors in grab sampling; sampling pumps for integrated systems; air flow measurements; sampling trains; factor affecting the efficiency of sample collection; and the analysis of gases and vapors by chemical, chromatographic, colorimetric, and spectrophotometric methods. Calculations for correcting sample volume to standard conditions of temperature and pressure are presented in an appendix.

51591

APTIC NO. 75110

Ranade, Madhav B.

SAMPLING INTERFACE FOR QUANTITATIVE TRANSPORT OF AEROSOLS (FINAL REPORT). *IIT Research Inst., Chicago, Ill., Environmental Protection Agency Contract 68-02-0579, Proj. 26AAM, Program Element 1AA010, Rept. EPA-650/2-74-016, 141p., Dec. 1973. 4 refs.*

NTIS: PB 240434/AS

A sampling probe for the quantitative transport of aerosols through a conduit from a source to a sensor is described. The probe consists of a porous metal tube encased in a manifold through which transpiration air is passed inward to provide a moving clean air sheath that minimizes particle deposition on the walls. The probe, which is 178 cm by 1.27 cm in size, requires only 14.2 l/min of transpiration air to virtually eliminate the deposition of particle in the 0.05 to 15 micron size range. Particles as large as 70 micron require as much as 283 l/min to prevent deposition losses at low sample flow rates. The porous probe is also effective in the preservation of size distribution. Optimization of the sample and transpiration flow ratio is necessary for a given size range to obtain the most effective use of the porous probe. (Author abstract modified)

51592

APTIC NO. 73724

Rastogi, K. Vikram and K. S. Shah

SAMPLING AND MEASUREMENT OF AIR POLLUTANTS FROM THERMAL POWER PLANTS. *World Meteorological Organization, Geneva (Switzerland) and World Health Organization, Geneva (Switzerland), World Meteorol. Organ./World Health Organ. Tech. Conf. Observ. Meas. Atmos. Pollut., Helsinki, Finland, 1973, p. 134-142, WMO-368, 11 refs. (July 30-Aug. 4, Paper N75 11490.)*

NTIS: N75-11476-540

Methods for the sampling and measurement of air pollutants from thermal power plants are reviewed, with particular emphasis on the measurement of sulfur dioxide, nitrogen oxides, and carbon monoxide. Sulfur dioxide monitoring can be performed with the hydrogen peroxide method which in reality estimates the total acid in the air. An inexpensive method for measuring carbon monoxide is the National Bureau of Standards Indicator Tube Method which gives a colorimetric reading. Nitrogen dioxide can be estimated in the presence of high sulfur dioxide concentrations by the Jacobs and Hochheiser method which also depends on a colorimetric determination. The method is suitable for measurements of ppm concentrations of NO₂.

51593

APTIC NO. 73957

Reeves, Alton Douglas

THE SURVEY AND DEVELOPMENT OF EQUIPMENT AND TECHNIQUES CAPABLE OF MONITORING AUTOMOTIVE EXHAUST EMISSIONS (FINAL REPORT).

Texas A and M Univ., College Station, Product/Production Graduate Engineering Program and Red River Army Depot, Texarkana, Tex., USAMC Intern Training Center, Rept. USAMC-ITC-2-73-18, 141p. March 1973, 69 refs.

NTIS: DDC: AD 784026

Automobile emission control requirements and methods for monitoring exhaust pollutants are reviewed. Topics covered include: emission control methods for spark ignition and diesel engines; test cycles and sampling systems; measurement methods such as nondispersive infrared spectrophotometry, gas chromatography, flame ionization detection, chemiluminescence, ultraviolet spectrophotometry, and electrochemical measurements; and the development of a colorimetric method for detecting carbon monoxide in automotive exhaust. Measurements of hydrocarbon and nitrogen oxide components in automotive exhaust are also described.

51594

APTIC NO. 73666

Roach, S. A.

SAMPLING AIR FOR PARTICULATES. In: *The Industrial Environment - Its Evaluation and Control*. Washington, D. C., Government Printing Office, 1973, Chapt. 13, p. 139-153, 14 refs.

GPO

Techniques and equipment for sampling primary and secondary airborne dust, mist, and primary and secondary fume in industrial atmospheres are reviewed. Topics discussed include: sampling variations in time and space; variations between instruments; air volume sampling requirements; sampling period duration; collection devices such as membrane filters, impingers, electrostatic precipitators, thermal precipitators, elutriators, and cyclones; treatment of the collected samples and preparation for counting, counting procedures; and statistical considerations for representative sampling.

51595

APTIC NO. 73958

Rothe, K. W., U. Brinkmann, and H. Walther

APPLICATION OF LASERS TO AIR POLLUTION MEASUREMENTS. *Inst. of Physics, Belgrade (Yugoslavia), Phys. Ek. Iron. At. Collisions, Invited Lect. Prog. Rept.*

In. Conf., 8th. Belgrade, Yugoslavia, 1973, p. 704-718, 33 refs.

The use of remote sensing lidar techniques for the monitoring of air pollution is discussed. Measurements are reported for such atmospheric species as water, sulfur dioxide, carbon dioxide, nitrogen dioxide, nitric oxide, and ethylene. Generally, there is a need for the development of more powerful tunable laser sources in the infrared and near ultraviolet spectral regions to make lidar detection of air pollutants feasible. Improvements in multi-wavelength detection systems are also required to allow for the observation of many pollutants simultaneously.

51596

APTIC NO. 73719

Suschny, O.

INTERCOMPARISON OF AIR FILTER MEASUREMENTS. *World Meteorological Organization, Geneva (Switzerland) and World Health Organization, Geneva (Switzerland), World Meteorol. Organ./World Health Organ. Tech. Conf. Observ. Meas. Atmos. Pollut., Helsinki, Finland, 1973, p. 39-48, WMO-368, 6 refs. (July 30-Aug. 4, Paper N75 11481.)*

NTIS: N75-11476-540

Intercomparisons of air filter measurements for radioactive contaminants or stable metallic trace constituents of aerosols organized by the International Atomic Energy Agency are discussed. The intercomparisons among 35 laboratories in 21 countries revealed that considerable systematic differences exist between laboratories for both radionuclide analysis and stable element determinations. More than 10% of the results were grossly incorrect. Overall, 24% of the laboratory means were injected during 1968 tests, and in 1972 the percentage of rejects was 13%. A continued system of analytical quality control is necessary to permit an assessment of the reliability of results obtained in air filter measurements. (Author conclusions modified)

51597

APTIC NO. 75335

Suzuka, Takamasa, Fumio Kimura, Kazuo Murakami, and Akira Terawaki

COLLECTION EFFICIENCIES OF A LIQUID METHOD IMPACT COLLECTOR - TWO STAGE NOZZLE CASE. (*Shitsu shiki shototsu shujinki no hoshu kouritsu - nijigen nozzle no bawai*). Preprint, Japan Society of Chemical Engineering, 4 refs. Translated from Japanese. Scientific Translation Service, Santa Barbara, Calif., 6p. (Presented at the Japan Society of Chemical Engineering, Fall Meeting, 7th. Nagoya, Japan, 1973.)

An expression for the total collection efficiency of a liquid impaction dust with a solid surface is derived and related to experimental data obtained with an impinger-type aerosol sampler with a two-stage nozzle impactor. Collision efficiencies observed experimentally appear to increase slightly as the depth of the liquid increases; however, with a high velocity, the difference becomes insignificant. Collection efficiency also increases as the inertia variable of the liquid surface tension increases. The experimental observations are in close agreement with theoretical values obtained from the expression for total collection efficiency.

51598

APTIC NO. 73755

Takabayashi, Yukikazu

THE METHOD FOR MEASUREMENT AND OBSERVATION OF NITROGEN OXIDES. *World Meteorological Organization, Geneva (Switzerland) and World Health Organization, Geneva (Switzerland), World Meteorol. Organ./World Health Organ. Tech. Conf. Observ. Meas. Atmos. Pollut., Helsinki, Finland, 1973, p. 206-215, WMO-368 (July 30-Aug. 4, Paper N75 11597.)*

NTIS: N75-11476-540

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Methods for detecting and measuring nitrogen oxides are reviewed along with the toxic effects of such compounds. The range of odor threshold is about 1-3 ppm, and concentrations near 13 ppm cause eye and nasal irritation in man. Concentrations of 500 ppm or more for short periods of time are capable of causing acute pulmonary edema in man. The most sensitive method for the determination of nitrogen dioxide in the atmosphere is the colorimetric Saltzman procedure. Nitric oxide can also be analyzed by this method if it is first oxidized by potassium permanganate solution to NO₂. Automatic analyzers with potassium permanganate solution as the oxidizer and Saltzman reagent for the colorimetric determination can be used for the continuous determination of NO and NO₂.

51599

APTIC NO. 73954

Thomas, L.

LASER SOUNDING EXPERIMENTS. In: *The Implications for European Space Programmes of the Possibilities of Manned Missions, III. Atmospheric Sciences, European Space Research Organization, Alpbach (Austria), Summer School, 29p., 1973. 31 refs.*

NTIS: N74-33347

The principles of laser operation are reviewed along with the application of remote sensing laser techniques to the measurement of atmospheric parameters up to an altitude of 100 km. Laser applications include the remote sensing of atmospheric density and temperature, the monitoring of dust particles in the upper atmosphere, especially at mesospheric heights, the observation of metal ions and atoms in the atmosphere, the study of the height distribution of atmospheric sodium between 80 and 100 km, measurements of cloud bases, the monitoring of aerosol trapping below temperature inversions, and the monitoring of gaseous constituents such as nitric oxide. Future developments projected include the operation of lasers at wavelengths below 0.3 micron, improvements in data processing, and the incorporation of laser experiments on spacecraft to provide world-wide measurements of atmospheric parameters.

51600

APTIC NO. 73743

Unsworth, M. H.

RADIATION MEASUREMENTS AS INDICATORS OF NATURAL AND MAN-MADE ATMOSPHERIC AEROSOL. World Meteorological Organization, Geneva (Switzerland) and World Health Organization, Geneva (Switzerland), World Meteorol. Organ./World Health Organ. Tech. Conf. Observ. Meas. Atmos. Pollut., Helsinki, Finland, 1973, p. 423-433, WMO-368. 18 refs. (July 30-Aug. 4, Paper N75 11520.)

NTIS: N75-11476-540

The effects of atmospheric aerosols on solar radiation are discussed along with methods for monitoring turbidity and distinguishing between different types of aerosols. It is possible in principle to extract information about aerosols from measurements of direct and/or diffuse radiation. The polarization and distribution of radiance for diffuse radiation over a cloudless sky yield valuable information on the optical properties of the aerosol, although the frequent presence of clouds and the effects of surface reflectivity make the interpretation of diffuse radiative fluxes difficult. Observations of direct radiation which are unaffected by clouds as long as the sky is clear within the viewing angle can be made for the irradiance due to the whole spectrum of the direct beam, the irradiance due to several broad wavebands, the spectral irradiance due to one or more very narrow wavebands, or the distribution of spectral irradiance over the whole spectrum. Measurements of the irradiance due to the whole spectrum of the direct beam yield only information on the overall attenuation of the solar beam by aerosols, whereas spectral data lead to conclusions about the type of aerosol.

1972

51601

APTIC NO. 74289

Coculescu, M. and P. Nita

DOMESTIC DEVELOPMENT OF FILTERS FOR THE DETERMINATION OF DUST CONCENTRATIONS IN THE AIR. (Preocupari privind realizarea de filtre romanesti pentru determinarea concentratiilor de praf din aer). Text in Romanian. Revista Minelor, 23(11):564-565, Nov. 1972.

A filter for the determination of ambient dust concentrations in coal mining areas is described. The nonhygroscopic filter consists of micron-sized unwoven fibers made of standard polystyrene with electrostatic properties. The filter is 45 mm in diameter and possesses a 10 sq cm filtering surface and a 64 to 84 mm water column pressure loss/30 l/min debit of air. Dust can be sampled up to a 60 C temperature. Tests with quartz and coal dusts revealed that the filter retains higher quantities of dust than the Soviet AFA V 10 filter. Field tests of the filter at a steelworks in Bucharest and in a coal mine demonstrated that the filter compares favorably with much more expensive filters.

51602

APTIC NO. 73872

Jansson, Anders and Bengt Steen

VARIATION IN ENTRANCE EFFICIENCY WITH CROSS WIND SPEED WHEN SAMPLING AIR-BORNE PARTICULATE MATTER WITH A CYLINDRICAL ELUTRIATOR. Swedish Water and Air Pollution Research Lab., Gothenburg (Sweden), Rept. B 128, 17p., Aug. 1972. 9 refs.

The effects of cross wind velocity and particle size on the entrance efficiency of particles sampled with a cylindrical elutriator were studied in an open wind tunnel. Talc particles with mean Stokes diameters of 4-9 micron were collected on membrane filters for cross wind velocities of from 0.5-9 m/sec. Entrance efficiency decreased with increasing cross wind velocity, reached a minimum, and then increased. Coarse talc showed a stronger dependence on wind speed than fine talc. The observed trends appeared to be a result of turbulent flow and the formation of vortices; hence, the results do not necessarily apply to other flow conditions, e.g., open air or other types of elutriators. (Author summary modified)

51603

APTIC NO. 73949

Monkman, J. L., J. Hilborn, A. Zdrojewski, and L. Dubois

DETERMINATION OF CHROMIUM IN AIRBORNE PARTICULATES BY ATOMIC ABSORPTION SPECTROPHOTOMETRY. Air Pollution Control Directorate, Ottawa (Ontario), Chemistry Div., Rept. EPS 4-AP-72-10, 23p., Dec. 1972. 7 refs.

A method for the determination of chromium in airborne particulates by atomic absorption spectrophotometry is described. Samples of airborne particulates are taken by high or low volume sampling techniques, with a measured volume of air being drawn through dry filter media. The filter material may be washed glass fiber, analytical grade cellulose, or an organic membrane. The filter is then wet ashed, and the acid digest is brought up to a standard volume with the addition of water. The chromium in the prepared sample can be very rapidly assayed by atomic absorption spectrophotometry in the flame mode if microgram sensitivity is sufficient. Nanogram sensitivity can be obtained by performing the atomic absorption analysis with a graphite furnace, assuming that reduced analytical output can be tolerated. (Author abstract modified)

51604

APTIC NO. 74221

Nakamura, K.

MEASUREMENT TECHNOLOGY AT AN OUTBREAKING POINT OF AIR POLLUTION. (Haseigen ni okeru sokutei gjutsu). Text in Japanese. Preprint, Japan Society

of Civil Engineering, p. 31-46, 1972. (Presented at the Japan Society of Civil Engineering, Lecture Meeting, Tokyo, May 23-24, 1972.)

Measurement methods for determining the total emission of gaseous pollutants from fixed sources are described. Total sulfur oxides are determined by the neutralization method, the Arusenazo III method, and the barium chloranilate method. Waste gases containing nitrogen dioxide, hydrogen chloride and chlorine cannot be analyzed for their total SO_x by the neutralization method. Sulfur dioxide can be analyzed by using a sulfamate solution as the absorbent and titrating with iodine. Fluoride can be analyzed using the lanthanum-alizarin complexone method by measuring the absorbance of the resulting complex near 620 nm. Chlorine can be analyzed by passing the gas into ortho-tolidine solution which results in the formation of a yellow solution (absorbance near 435 nm). Hydrogen chloride can be analyzed by a spectrophotometric method (mercuric thiocyanate method) or a volumetric method (silver nitrate method and neutralization method). A correction is required if chlorine coexists. Total nitrogen oxides can be analyzed by the naphthylethylenediamine method. The continuous determination of the above substances by conductivity, infrared analysis, potentiometry, ultraviolet analysis, chemiluminescence, and gas chromatography is also briefly discussed.

51605

APTIC NO. 75315

DUST MEASUREMENTS IN FLOWING GASES, RECORDING MEASURING DEVICES, PHOTOELECTRIC MEASURING DEVICES, CALIBRATION. (Staubmessungen in stromenden Gasen Registrierende Messeinrichtungen Fotoelektrische Messgeraete Kalibrierung). VDI (Ver. Deut. Ingr.), no. 3672, Jan. 1972. 11 refs. Translated from German. Leo Kanner Associates, Redwood City, Calif., 15p., Feb. 1975.

Guidelines for the measurement of stack gas dust content with photoelectric measuring devices are presented. The guidelines refer to calibration procedures, technical prerequisites for photoelectric dust concentration meters, selection of measuring points in the stack, comparison gravimetric determinations, statistical analysis of the data, and the reporting of measurements. Vertical duct measurements are preferred to horizontal stack measurements since dust deposition is a problem with the latter. The beam of light used in the measurement must cross the duct on an axis representative of the entire duct, whenever the dust concentration in the entire duct is to be deduced from the measurement.

1971

51606

APTIC NO. 73881

Nakano, Nobuhiko

ANALYTICAL METHOD FOR NO IN SMALL AMOUNTS OF SAMPLES BY GAS CHROMATOGRAPHY-MASS SPECTROMETRY. (GC-MS ni yoru shoryo sanpuru chu no NO bunsekiho ni tsuite). Text in Japanese. Nihon Jidoshi Kenkyusho Hojo Jigyo Hokokusho (Japan Auto. Res. Inst., Inc. Rept.), vol. 1971:89-94, March, 1971.

The nitric oxide in diesel engine exhaust gas was analyzed by a gas chromatographic-mass spectrometry combination technique. Although five different GC columns were used, the best result was obtained from the Porapak GS in a stainless steel column and the NO retention time was 48 sec which was same as that of methane and ethylene. However NO could be separately determined from these two compounds by using the m/e value of 30 on the mass spectrogram. The effect of NO oxidation to nitrogen dioxide by the presence of coexisting compounds was studied. No effects by carbon carbon monoxide, carbon dioxide, hydrogen gas, or methane were observed within 2 hr after sampling the gas mixture; however, nitrogen

gas affected NO oxidation. The correction factor for NO determination under the presence of oxygen and nitrogen was determined and used. The corrected NO values in the GS-MS method agreed with those obtained in a nondispersive infrared method. The NO detection limit by the GC-MS method (with signal to noise ratio of 2 to 1 on the chromatogram) was 4 ppm. The method is advantageous as a rapid trace NO analysis (a few ppm level of NO) with fewer interferences. Only a small amount of sample was required for the analyses.

51607

APTIC NO. 74234

Weinstein, L. H. and R. H. Mandl

THE SEPARATION AND COLLECTION OF GASEOUS AND PARTICULATE FLUORIDES. VDI (Ver. Deut. Ingr.) Ber., no. 164:53-70, 1971. 20 refs.

Laboratory and field tests of three methods for the separation and collection of gaseous and particulate fluorides were conducted. The three sampling procedures evaluated comprised: bicarbonate-coated tubes with citric acid-treated Acropor AN-800 membrane filters fitted to either the inlet or the outlet ends of the tubes, a double-tape sampler with a citric acid-treated Whatman No. 52 prefilter tape and a Whatman No. 4 alkali-treated tape, and duplicate filter holders each containing citric acid-treated Acropor AN-800 membrane as a prefilter and an alkali-treated Whatman No. 41 paper to collect gaseous fluoride. The results for gaseous fluoride collected by the three devices were reasonably close, although the tape sampler gave results considerably higher than the others on 3 days. The tape sampler also showed wide diurnal fluctuations in fluoride concentration which was highest during warm periods when fluoride desorbed from chamber surfaces. The bicarbonate-coated tubes were sensitive to humidity; moisture condensation resulted in partial or complete removal of the bicarbonate coating from the tubes.

51608

APTIC NO. 73705

Zwick, Harold

FINAL REPORT ON GROUND CHOPPER TECHNIQUE. Barringer Research Ltd., Rexdale (Ontario), 65p., Sept. 1971. 29 refs.

A ground chopping technique, utilizing a two-channel radiometer and a telescope to decrease the field of view, was developed and field tested for its ability to reduce the problem of scattering encountered during remote sensing. The system used the reflectivity changes of the earth's surfaces to discriminate against the scattered radiation from the atmosphere. Airborne tests indicated that the ground chopper technique was effective in reducing, if not eliminating, the effects of scattered radiation. The most promising application of the chopper appeared to be for making total burden measurements from aircraft altitudes. The technique did not appear to be practical for making integrated burden measurements at satellite or balloon heights.

51609

APTIC NO. 75320

INSTRUCTIONS FOR DUST EMISSIONS MEASUREMENTS PERFORMED ON SOLID FUEL BOILER SYSTEMS. VDI (Ver. Deut. Ingr.) Richtlinien, no. 2091, Jan. 1971. Translated from German. Leo Kanner Associates, Redwood City, Calif., 4p., Feb. 1975.

Guidelines for the measurement of dust emissions from solid fuel boilers are presented. Emission measurements over the measurement cross section must extend over a period of time that allows for a sufficient amount of sample to be obtained for determining the mean dust content across the section. At least three measurements are required; and dust content, if feasible, is measured at a point downstream from which no further dust precipitation occurs. Parameters required for such monitoring include: the gas flow velocity, gas dust content, gas condition and composition, gas moisture, and the pressure of the external air.

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1969

51610

APTIC NO. 75317

DUST CONTENT MEASUREMENT IN FLOWING GASES. (*Staubgehaltsmessung in stromenden Gasen*). *Stahl-Eisen Betriebsbl. Ver. Deut. Eisenhuettenleute*, 1969 (?). 5 refs. Translated from German. Leo Kanner Associates, Redwood City, Calif., 38p., Feb. 1975.

Techniques for making dust content measurements in stack gases are reviewed. Topics discussed include: continuous versus discontinuous operations; the use of sampling probes; the flow sampling duration; points of measurement; the selection of the filter materials for dust sampling; the measurement of other stack gas parameters such as temperature, static pressure, humidity, and flow rate; applications of various dust measuring devices; laboratory preparation of dust samples; and the statistical interpretation of analytical results. Generally, the duration of flow sampling for discontinuous production processes must be chosen so that the dust covering the filter does not amount to more than 5% of the filter weight. All measurements in flowing gases must be taken at a point of quasi-steady flow; and the points for measurements of pressure, temperature, gas velocity, and moisture must be as close as possible to the point of dust sampling. At least six points of measurement on each axis of the stack are recommended for representative sampling.

1968

51611

APTIC NO. 74046

Surikov, O. M.

EXPERIMENTAL METHODS OF ATMOSPHERIC AEROSOL RESEARCH. I. METHODS OF SAMPLE COLLECTION AND ANALYSIS. *Probl. Fiz. Atm.*, no. 6: 63-77, 1968. 15 refs. Translated from Russian. United States Air Force, Wright Patterson AFB, Ohio, Translation Div., 23p., Oct. 7, 1974.

NTIS, DDC: ADA000112

Methods for the sampling and analysis of atmospheric aerosols are discussed. The simplest method of analyzing aerosol samples is gravimetric analysis, though it is not always possible to obtain samples in amounts greater than 0.0001 gm, which is the limit of the method. Optical microscopy can be used to obtain information about the aerosol size distribution, particle morphology, and chemical composition with the aid of ultra-microchemistry. Dispersometric analysis of aerosol particles with an optical microscope can be performed on particles with diameters greater than or equal to 0.3 micron. Electron microscopy can be used to perform a complete dispersometric analysis of aerosol samples. The deposition of aerosol particles can be performed with a nitrocellulose substrate which is placed on the supporting grid of the microscope. The collection of aerosol samples can be achieved by taking advantage of gravitational forces, electrostatic and radiometric forces, diffusion, and inertia. Distortions with aspiration during sampling occur when isokinetic conditions are not satisfied. Neutron activation is an extremely sensitive method for the chemical analysis of aerosols. Identification of the isotopes formed after neutron irradiations is performed according to the type of decay, the half-life, and the energy composition of the isotope emissions.

1965

51612

APTIC NO. 75330

Kruppe, Herbert

MEASURING GAS FLOW RATES WITH FLOW PROBES. (*Gasmengenmessung mit Stromungssonden*). *Tech. Ueberwach. (Duesseldorf)*, 6(10):340-347, 1965. 26 refs. Translated from German. Leo Kanner Associates, Redwood City, Calif., 31p., Feb. 1975.

Factors involved in the measurement of stack gas flow rates with flow probes are reviewed. Topics discussed include: the principles of flow mechanics, the measurement of total pressure, static pressure probes, stagnation pressure probes, and grid measurements. For parallel flow with a uniform static pressure distribution over the flow cross section, as is usually the case with low gas velocities, it is sufficient to measure total pressure distribution with a Pitot tube and static pressure with wall holes. If static pressure is not uniformly distributed, measurements can be taken with a Prandtl tube. Measurement devices that produce pressure readings as a function of stagnation pressure are not recommended for approval and operational tests.

AIR QUALITY MEASUREMENTS

1975

51613

APTIC NO. 74011

Alkezweeny, A. J. and M. A. Wolf

COMPARISON OF DROPLET SIZE DISTRIBUTIONS IN A CUMULUS CLOUD AND A COOLING TOWER PLUME. In: *Pacific Northwest Laboratory Annual Report for 1974 to the USAEC Division of Biomedical and Environmental Research. Part 3: Atmospheric Sciences. Battelle Memorial Inst., Richland, Wash., Pacific Northwest Labs., Rept. UC-11, p. 247-251, Feb. 1975. 2 refs.*

NTIS: BNWL-1950 PT3

An airborne droplet size spectrometer was used to measure droplet distributions in a natural cumulus cloud and in the plume of a mechanical-draft cooling tower. The observed mass-median diameters of both were in the range of 10-15 micron. An obvious increase in droplet size with altitude was noted for the cloud. Liquid water content ranged between 0.0065 and 0.0303 g/cu m in the plume and 0.0680 and 0.2472 g/cu m in the cloud. The highest water content value for the cloud was observed midway between the cloud base and its top. Drip droplets mechanically created within the cooling tower appeared to constitute an appreciable portion of the liquid water observed at the large droplet end of the spectrum in the plume. (Author abstract modified)

51614

APTIC NO. 73829

Doi, Hiroshi

INDUSTRIALIZATION AND ENVIRONMENTAL POLLUTION. (*Kogyoka to kankyo kagai*). Text in Japanese. Toshi Mondai (J. Tokyo Inst. Munic. Res.), 66(3):43-62, March 1975.

Pollution at newly developed industrial cities in Tokushima and Akita Prefectures was investigated. The yearly average sulfur dioxide concentration at Imakiri city of Tokushima Prefecture was 0.034 ppm in 1970, and 0.015 ppm in 1972, and 0.023 ppm in 1973. The highest 1-hour value was 0.19 ppm in 1970 and 0.133 ppm in 1973. The yearly average airborne particulate concentration was 0.01 mg/cu m in 1969 and 1970, 0.051 mg/cu m in 1972, and 0.065 mg/cu m in 1973. Investigation by distributing questionnaires to 24,000 residents in Tokushima revealed that 1.50% in the Uchimachi area and 0.82% in the Kitajima area in 1971 had respiratory diseases. About 35% of the bronchial asthma patients were the victims of air pollutions. At Anan city of Tokushima Prefecture, the average SO₂ concentration decreased from 0.040 ppm in 1969 to 0.019 ppm in 1973 and the average airborne particulate concentration decreased from 0.073 mg/cu m in 1969 to 0.043 mg/cu m in 1973. Average SO₂ concentrations measured at 6 locations in Akita city ranged from 0.005 ppm to 0.024 ppm in 1972 and 0.007 ppm to 0.022 ppm in 1973. The monthly dust concentrations measured at 4 locations ranged from 14.83 ton/sq km/mo to 28.83 ton/sq km mo.

51615

51615

APTIC NO. 74231

Gordon, S. J. and S. A. Meeks

A STUDY OF THE GASEOUS POLLUTANTS IN THE HOUSTON, TEXAS AREA. *American Inst. of Chemical Engineers, New York, 33p., March 1975. 4 refs. (Presented at the American Institute of Chemical Engineers, National Meeting, 79th and the 8th Petrochemical and Refining Exposition, Houston, Tex., March 16-20, 1975.)*

Field data obtained from an 8-week sampling of ambient gaseous pollutants in the Houston, Texas area during June and July of 1974 are reported. Over 100 samples were collected in Tedlar bags and analyzed by flame-ionization gas chromatography and long-path infrared Fourier transform absorption spectroscopy. Concentrations of various hydrocarbons (saturated and unsaturated), vinyl chloride, carbon monoxide, vinyl acetate, and ammonia are given. Hourly averages are given in monthly summaries, and quarterly summaries are compiled to give the high, second high, arithmetic mean, and standard deviation of the hourly averages for the previous 3 mo. Also given are the number and percentage of hours during which the ambient air quality standard is exceeded.

51616

APTIC NO. 74238

Grennfelt, Perigge

MEASUREMENT OF OZONE IN GOTHENBURG JANUARY 1972-AUGUST 1973 AND STUDIES OF CO-VARIATIONS BETWEEN OZONE AND OTHER AIR POLLUTANTS. *Swedish Water and Air Pollution Research Lab., Gothenburg, Rept. B 221, 35p., Jan. 1975. 10 refs.*

Ambient ozone measurements were performed in Gothenburg, Sweden during the period January 1972 to August 1973. The highest 1-hour mean ozone level was 110 ppb in 1972 and 97 ppb in 1973. High ozone peak concentrations coincided with increased concentrations of particle-borne sulfur and also with soot in many cases. Precipitation occurring at the time of increased ozone concentrations contained high concentrations of sulfuric acid. The ozone concentration over the entire sampling period did not on any occasion reach or exceed the level normally used to mark photochemical smog episodes (150 ppb). (Author abstract modified)

51617

APTIC NO. 73858

Izumikawa, Sekio, Nobuo Ito, Masanao Funazima, Tomio Hirano, Hisashi Yokota, Masataka Soufuku, Kunihiko Asakuno, Kinji Nakano, and Toshio Oodaira

RELATIONSHIP OF NITROGEN OXIDES AND HYDROCARBONS TO PEROXYACETYL NITRATE (PAN). In: *Annual Report of the Tokyo Metropolitan Research Institute for Environmental Protection. p. 9-22, 1975. 2 refs.*

Field measurements of peroxyacetyl nitrate, nitrogen oxides, and hydrocarbons were made in heavily, moderately, and slightly polluted areas of Japan. Maximum PAN concentrations of 31.2 ppb were recorded in heavily polluted urban areas (central Tokyo) and were nearly as severe as levels recorded at Riverside, California when environmental conditions were at their worst (i.e., when NOx and hydrocarbons reached their highest concentrations). Changes in PAN concentration with time were similar to those for oxidant levels. Regional differences were observed in the ozone/PAN ratio; apparently the point of residual equilibrium for ozone in the photochemical reaction system of NOx, hydrocarbons, and O3 varied depending on regional differences in the concentrations of ozone-destructive pollutants such as nitric oxide and suspended particulates. The peak concentration of O3 varied in relation to the peak curves for oxidants and PAN both against non-methane hydrocarbons and NOx, with the concentration being higher in regions where NOx and non-methane hydrocarbon concentrations were lower. Peak PAN concentrations followed a reverse trend. The consumption of hydrocar-

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bons and NOx during photochemical smog reactions increased with oxidant and PAN concentration. (Author conclusions modified)

51618

APTIC NO. 74016

Laulainen, N. S.

ATMOSPHERIC TURBIDITY OVER HANFORD. In: *Pacific Northwest Laboratory Annual Report for 1974 to the USAEC Division of Biomedical and Environmental Research. Part 3: Atmospheric Sciences. Battelle Memorial Inst., Richland, Wash., Pacific Northwest Labs., Rept. UC-11, p. 269-272, Feb. 1975. 5 refs.*

NTIS: BNWL-1950 PT3

Multiwavelength turbidity data obtained by sunphotometry at the Hanford Meteorological Station from July 12 to October 30, 1974 are presented. The turbidity values vary by as much as a factor of 3-5, depending on the wavelength; and the wavelength dependence changes from day to day. The latter observation perhaps signifies changes in particle size distribution or aerosol complex index of refraction or both. An anomalous red hump is observed in most aerosol optical depth spectra which cannot entirely be accounted for by ozone absorption. (Author abstract modified)

51619

APTIC NO. 73965

Ludwick, J. D., C. W. Thomas, L. L. Wendell, and T. D. Fox

QUILLAYUTE AIR REFERENCE STATION. In: *Pacific Northwest Laboratory Annual Report for 1974 to the USAEC Division of Biomedical and Environmental Research. Part 3: Atmospheric Sciences. Battelle Memorial Inst., Richland, Wash., Pacific Northwest Labs., Rept. UC-11, p. 1-12, Feb. 1975. 4 refs.*

NTIS: BNWL-1950 PT3

The continuous monitoring of radioactive and non-radioactive airborne constituents at the Quillayute Air Base is described along with some of the results to date. The continuous air monitoring program includes measurements of condensation nuclei, ozone, nitric oxide, carbon monoxide, methane, and total hydrocarbons. Typical air concentrations during periods of clean air influx show very low values for lead and general elemental pattern. Low lead values are accompanied by high chloride values due to ocean trajectory air. Correlations are apparent between the natural aerosol composition and air masses whose shorter range trajectory is northerly from remote land regions. Correlations are also apparent between radionuclide and maximum ozone concentrations; these are attributed to the subsidence of upper level air whose origin can eventually be traced to the stratosphere. The effects of precipitation scavenging are evident from the unusually low observed values for radionuclides during periods of continuous precipitation.

51620

APTIC NO. 74004

Sehmel, G. A.

A POSSIBLE EXPLANATION OF APPARENT ANOMALOUS AIRBORNE CONCENTRATION PROFILES OF PLUTONIUM AT ROCKY FLATS. In: *Pacific Northwest Laboratory Annual Report for 1974 to the USAEC Division of Biomedical and Environmental Research. Part 3: Atmospheric Sciences. Battelle Memorial Inst., Richland, Wash., Pacific Northwest Labs., Rept. UC-11, p. 221-223, Feb. 1975. 4 refs.*

NTIS: BNWL-1950 PT3

Airborne samples of plutonium obtained in the Rocky Flats area at elevations of 0.3-30 m above ground were analyzed for isotopic content to determine the amount of resuspension occurring from the soil. The maximum airborne concentration of plutonium-239 measured was 3.7 times 10 to the -15 Curie/cu m. The airborne concentrations did not decrease with increasing altitude as expected; rather, they increased, suggesting an elevated plutonium source. Additional data on isotopic ratios

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of plutonium supported the hypothesis that a source of air-borne plutonium was present in addition to that of locally resuspended soil. Although the isotopic content of plutonium at 30 m elevation was not similar to that of plutonium processed at a plant in the Rocky Flats area, plant release of the element was not ruled out as the cause of plutonium elevation with height.

51621

APTIC NO. 73810

Tsubura, Keiko, Masayoshi Okamoto, and Hiromi Yoshida

COMPARATIVE STUDIES ON THE CONCENTRATIONS OF THE INDOOR AND OUTDOOR AIR POLLUTANTS. (Taiki osen bushitsu no shitsunai shitsugai nodo no hikaku). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 779, 1975. (Presented at the Japan Chemical Society Spring Term Annual Meeting, 32nd, Tokyo, Japan, April 1-4, 1975, Paper 1031.)

Air pollutant levels inside a research laboratory were analyzed for ozone, nitric oxide, nitrogen dioxide, and nitrogen oxides by chemiluminescence, sulfur dioxide by coulometry, and methane, total hydrocarbons, and carbon monoxide by a gas chromatograph equipped with a flame ionization detector. The results are compared with those obtained for the outdoor air of the laboratory. During the operating hr of an air conditioner (day time) there was no appreciable difference in the NO and NO₂ levels between indoor and outdoor. However, lower levels were noted for the indoor SO₂ and O₃; 15% and 19% of the outdoor levels respectively. The lower level observed for SO₂ was attributed to the filtration effect by filters in the air conditioner. The indoor levels for total hydrocarbons, methane, and CO were all higher than outdoor levels during day time. When the air conditioner was not operated (night time), the indoor and outdoor levels of NO, CO, and methane were nearly the same; however, the indoor level of total hydrocarbons increased to three times that in the day time, indicating the effect of combusting facilities in the room and the accumulation of combustion products. The ozone level at night was lower than that of the day time.

51622

APTIC NO. 73886

Environmental Agency (Japan)

AIR POLLUTION IN JAPAN: SUMMARY AND OBSERVATION OF AIR POLLUTION AT THE NATION-WIDE MONITORING STATION IN 1973. (Nippon no taiki osen jyoku ni tsuite: showa 48 nendo zenkoku jyoji kanshi sokutei kyoku ni okeru sokuteichi to sono galyo). Text in Japanese. Taiki Osen Nyusu (Air Pollution News), no. 87:2-5, March 1975.

Data on pollutant concentrations monitored at over 100 stations during 1973 are compiled and analyzed. Sulfur dioxide concentration has shown a decreasing trend since 1971, and the environmental standard was attained at 32% of the monitoring stations in 1971 and 46% in 1973. Nitrogen dioxide concentration showed little variation from the previous three years (0.0239 ppm in 1970 and 0.0267 ppm in 1973). Nitric oxide concentration showed a slight decreasing trend (0.0294 in 1971, 0.0277 in 1972, and 0.0259 ppm in 1973). Oxidant concentration varied in the range of 0.020-0.042 ppm during the period of 1969-1974. Carbon monoxide concentration generally showed a decreasing trend (5.0 ppm in 1968 and 1.7 ppm in 1973 in Tokyo). Hydrocarbon concentration varied little during the period of 1968-1973 (in the range of 0.90-1.0 ppm). Lists of cities where SO₂, NO₂, and CO environmental standards are attained and lists of monitoring stations with high SO₂, NO₂, NO, CO, oxidant and HC concentrations are also given.

51623

APTIC NO. 74096

PRESENT STATUS AND COUNTERMEASURE OF POLLUTION IN YAMAGUCHI PREFECTURE. (Yamaguchi-ken ni okeru koga no genjo to taisaku). Text in Japanese. Kankyo Kenkyu (Environ. Studies), no. 9:65, 73, March 1975.

Yamaguchi Prefecture, bounded by the sea on three sides with many fishing industries, has three major industrial areas of power plants, petroleum refineries, and petrochemical, synthetic fiber, pulp, and cement works. The highest sulfur oxides concentrations measured were 0.037 ppm at Ube and 0.036 ppm at Shinnanyo in spite of the decrease in SO_x emission compared to that of 1972. The suspended particulate concentration measured at 29 locations showed the highest value of 0.070 mg/cu m at Miya and 0.063 mg/cu m at Ube. The falling particulate level has shown a decreasing trend since 1970, and cities where more than 10 tons/k sq m/mo was measured were Ube, Onada and Miya. The nitrogen oxides concentration was in the range of 0.014 ppm to 0.035 ppm, and oxidant concentration was in the range of 0.025 ppm to 0.045 ppm. The emission standards issued in Jan. 1972, revised in April 1974, and presently enforced are explained. The air pollution control measures taken during 1974 are described. As for the water pollution of rivers and oceans, data on pollution level in terms of BOD and COD (biological and chemical oxygen demand) are compiled, and environmental standards and control measures taken during 1974 are described. The status of noise and malodor pollution and refuse treatment processes are discussed as well as the pollution control administration at the municipal level and pollution complaints and disputes.

51624

APTIC NO. 74121

Shizuoka Prefectural Government (Japan)

AIR POLLUTION. (Taiki osen). Text in Japanese. In: Shizuoka Prefectural Environmental White Paper, 1974. p. 15-68, 1975.

Sulfur dioxide concentrations measured at 20 locations in the Fuji area during 1973 ranged from 0.008 ppm at Shibakawa-cho to 0.047 ppm at Imaizumi. The concentrations measured at 16 locations in the Shizuoka-Shimizu area ranged from 0.013 ppm at Ryunan to 0.034 ppm at Shimizu. The concentrations measured at 12 locations in the Numazu-Mishima area ranged from 0.017 ppm at Tokukura to 0.029 ppm at Nagaizumi. The concentrations measured at eight locations in the Hamamatsu area ranged from 0.019 ppm to 0.51 ppm. The yearly average nitrogen dioxide concentrations measured at 10 locations ranged from 0.018 ppm at Banda and Hakoue to 0.043 ppm at Shizuoka. The yearly average airborne particulate concentrations measured at 33 locations ranged from 0.010 mg/cu m to 0.104 mg/cu m. The average hydrogen fluoride concentrations measured at 10 locations ranged from 0.1 ppb to 0.4 ppb.

51625

APTIC NO. 74147

Fukuoka Prefectural Government (Japan), Bureau of Public Health

THE GENERAL CONDITIONS OF AIR POLLUTION. (Taiki osen no suikyo). Text in Japanese. In: Fukuoka Prefectural White Paper on the Environment in 1974. p. 55-94, Jan. 1975.

Air pollution measurements conducted in Japan during 1973 are reported. The average SO₂ concentrations measured at 30 locations ranged from 0.037 ppm at Kamimiya monitoring station of Omuta city to 0.007 ppm at Koshun-cho. The highest average dust concentration is Kitakyushu city was 21.2 tons/sq km/mo at Shiroyama Elementary School, the average concentrations at Koshun-cho, Takawa city and Omuta city were 16.3, 14.3 and 13.1 tons/sq km/mo, respectively. The average airborne particulate concentrations ranged from 0.13 mg/cu m at the Shichiura monitoring station to 0.019 mg/cu m at the Yahata monitoring station. The average nitric oxide and nitrogen dioxide concentrations measured at 18 locations ranged from 0.148 ppm at Miogino Station and 0.066 ppm at Kurozaki Station to 0.006 ppm at Tsukine Chubu High School and 0.015 ppm at Hirao, respectively. The average carbon monoxide concentrations at seven locations ranged from 4.4 ppm to 1.6 ppm. Average oxidant concentrations at nine locations ranged from 0.037 ppm to 0.008 ppm.

51626

APTIC NO. 75351

Office of Air and Waste Management, Research Triangle Park, N. C., National Air Data Branch

AIR QUALITY DATA - 1974 FIRST QUARTER STATISTICS. Rept. EPA-450/2-75-002, 120p., April 1975. 3 refs.

Ambient air quality data for the first quarter of 1974 submitted to the Environmental Protection Agency's National Aerometric Data Bank by state, local, and Federal monitoring networks are summarized. The data cover particulates, carbon monoxide, sulfur dioxide, nitrogen dioxide, hydrocarbons, total oxidants, and ozone. Each summary line of data is preceded by the Air Quality Control Region within which the sampling site is located, the city or county within which the site is located, the three-digit site number within the city or county, and an Agency Type Code that indicates the type of agency responsible for the laboratory analysis. A Project Code is shown with the Agency Type Code to indicate the type of surveillance being conducted. Both parametric and non-parametric indices of air quality are reported. The number of observations, the minimum and maximum value measure for the period of record, and the odd deciles plus the 95th and 99th percentiles describe the distribution of observed values. Arithmetic and geometric means and standard deviations provide some measure of central tendency and dispersion.

1974

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APTIC NO. 74061

Abriegeon, E., P. Isoard, R. Fontanges, and P. Riva

AIR POLLUTION STUDY IN SOME BIG CITIES OF FRANCE BY COMPUTERIZED PROCESSING OF THE DATA COLLECTED BY SMOKE-FUME MONITORING NETWORKS. (*Etude de la pollution de quelques grandes villes de France à l'aide d'un traitement informatique des résultats données par les réseaux S. F.*) Pollut. Atmos. (Paris), no. 64:422-435, Oct.-Dec. 1974. 11 refs.

Results of a computerized factorial analysis of dust and acid pollutant concentrations monitored systematically in Paris, Lyon, Grenoble, Nantes, Besançon, and Marseille are presented. In Lyon, where pollution was mainly due to domestic heating, the pollution levels were lowest in new housing projects and in well ventilated sections of the city. In Paris, pollution was highest in zones with high population density and little industry, as emissions from industrial districts were not swept through the city. The promiscuity of industry and residential areas in Marseille resulted in very high pollution levels as compared with other towns. The separation of industrial from residential areas in Nantes resulted in low pollution level. Unlike the evolution of the acid pollutant levels, that of the dust concentrations showed a similar pattern in all agglomerations studied.

51628

APTIC NO. 74034

Butler, J. D. and S. D. MacMurdo

INTERIOR AND EXTERIOR ATMOSPHERIC LEAD CONCENTRATIONS OF A HOUSE SITUATED NEAR AN URBAN MOTORWAY. Int. J. Environ. Studies, vol. 6:181-184, 1974. 7 refs.

Particulate lead concentrations within and around a house located near an urban roadway were measured over a 3-week period during November and December of 1973. Samplers were positioned in the downstairs front room, in the front garden of the house, and at the highway junction access-exit roundabout. Indoor atmospheric concentrations averaged 0.87 micrograms/cu m in comparison to 0.89 and 1.57 micrograms/cu m for the garden and roundabout locations, respectively. Fluctuations in daily lead concentration ranging between 0.2 and 2.4 micrograms/cu m around the house followed the pattern of lead contamination at the highways, with meteorological factors exerting a controlling influence on the concentration pattern. Analyses of blood samples obtained

from the occupants of the house revealed blood lead levels of around 24 micrograms/100 ml, well within accepted levels.

51629

APTIC NO. 74250

Colovos, G., G. S. Wilson, and J. L. Moyers

PARTICLE SIZE DETERMINATION OF TRACE ELEMENTS IN URBAN AIR. Int. J. Environ. Anal. Chem., vol. 3:239-252, 1974. 23 refs. (Presented at the Symposium on Recent Advances in the Analytical Chemistry of Pollutants, Halifax, Nova Scotia, Aug. 23-25, 1972.)

Airborne urban particulate matter was collected and fractionated according to size by cascade impactors situated about 10 m above ground and was then analyzed for the elements zinc, cadmium, copper, lead, aluminum, iron, manganese, calcium, and magnesium. The average mass median equivalent diameter of Cd and Pb was approximately 0.1 micron; and the average MMDs for Zn, Cu, Mg, and Fe were between 0.3 and 0.4 micron. The MMDs for Al, Ca, and Mn were between 0.5 and 0.6 micron. Examination of the elemental ratios (using Al as a reference element) revealed that Pb and Cd were about 1000 times more concentrated in atmospheric particulate matter than in average crustal material and that in general the Pb/Al and Cd/Al ratios were inversely proportional to particle size. The Zn/Al and Cu/Al ratios of atmospheric particles were more or less independent of particle size and approximately 20 times higher than the corresponding ratios for crustal material. The ratios Fe/Al, Mn/Al, Ca/Al, and Mg/Al in all sizes of particulate matter were essentially identical to the average crustal material ratios. (Author abstract modified)

51630

APTIC NO. 69637

Hinton, David O., Thomas D. English, Blaine F. Parr, Victor Hasselblad, Richard C. Dickerson, and Jean G. French

HUMAN EXPOSURE TO AIR POLLUTANTS IN THE CHICAGO-NORTHWEST INDIANA METROPOLITAN REGION, 1950-1971. In: Health Consequences of Sulfur Oxides: A Report From CHESS, 1970-1971. Environmental Protection Agency, Research Triangle Park, N. C., National Environmental Research Center, EPA-650/1-74-004, p. 4-3 to 4-21, May 1974. 10 refs.

NTIS: PB 234 920/AS

Sulfur dioxide, total suspended particulates, suspended sulfate, and dust fall measurements for the City of Chicago and for the Chicago-Northwest Indiana Metropolitan area were obtained from NASN and CAMP measurements in recent years. Based on these measurements, it was possible to project pollutant exposure in these areas for the period 1950-1970. The exposure estimates indicated a definite pollution exposure gradient among Chicago areas considered in an acute respiratory disease study (Intermediate, High, and Highest) and between Chicago-Northwest Indiana areas considered in a chronic respiratory disease study (High I, High II, Low). In some instances, sulfur dioxide exposures in the High II area equaled or exceeded those in the High I area, possibly as a result of proximity to point sources. Low exposures for the outlying Low area, attributed to fewer sources per unit area, were verified. (Author summary modified)

51631

APTIC NO. 72172

Imai, Y., M. Ito, K. Tsuchida, S. Ito, H. Yoshinari, and M. Kondo

VARIATION OF POLLUTANTS IN PHOTOCHEMICAL SMOG (II). (Kokagaku sumoggu hassei doki ni okeru oenshitsu no doko (II). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):583, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 432.)

Ozone and oxidant concentrations in photochemical smog were measured at three locations (bayside (west), oceanside (east), and inland (northeast of bayside)) in Chiba Prefecture, Japan, from June to July 1973, during the same time periods. At the bayside location, oxidant concentrations were measured

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at heights of 4 m and 30 m. Data from oceanside and inland measurement stations more or less agreed in tendencies. There was not much difference between ozone and oxidant concentrations; i.e., the oxidant pollutant was ozone for all practical purposes. At the bayside location, oxidant concentration was much higher than ozone concentration, even after correction for nitrogen oxides. Oxidant concentration at a height of 4 m was about half the oxidant concentration at 30 m, whether pollutant concentrations for the day were normal or high. It is conceivable that a 4 m, ozone is decomposed by carbon monoxide emission from automobile exhausts.

51632

APTIC NO. 74182

Jeanmaire, L. and R. Gros

THE USE OF X-RAY FLUORESCENCE IN AIR POLLUTION STUDY. STATISTICAL INTERPRETATION OF THE RESULTS. (Utilisation de la fluorescence X dans l'étude de la pollution atmosphérique. Interprétation statistique des résultats). Text in French. Pollut. Atmos. (Paris), no. 63:335-340, July-Sept. 1974, 3 refs.

A statistical analysis is presented of atmospheric lead, copper, bromine, iron, calcium, sulfur, potassium, zinc, nickel, chlorine, and manganese concentrations determined by X-ray fluorescence analysis of samples taken in Paris and Orsay during the April 1971 - March 1972 period. The overall pollution level was higher in Paris than in Orsay. The lead, bromine, and sulfur concentrations were highest during the months November, December, January, February, and March, and the iron, zinc, and manganese levels were highest during May, June and July. The pollution level was lowest in August, and highest in April and September. A correlation coefficient of over 0.9 was established within the groups lead-bromine and iron-zinc-manganese, while the inter-group correlation was low with less than 0.3. Negative correlation was established between the number of rainy days and the pollution level. The lead and bromine concentrations were more closely correlated with the number of rainy days than they were with each other, despite their common origin.

51633

APTIC NO. 71665

Karasawa, S., Y. Endo, M. Kitazume, Y. Yoshinaga, M. Suzuki, and E. Yoneyama

INVESTIGATION OF SEVERAL AIR POLLUTANTS AT SHOWA STATION. (Showa kichi fukin no taiki osen). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):538, Nov. 1974 (Presented at the National Air Pollution Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 386.)

Sedimented dust, airborne dust, and soil at the Antarctic Showa Station are analyzed for lead, copper, cadmium, manganese, nickel, and iron by atomic absorption spectrometry. The samples were collected by a dust jar and a high-volume air sampler at 14 different locations within 900 m of the station. The sulfur oxides level was also determined using lead oxide. The average amounts of Pb, Cu, Cd, Mn, Ni, and Fe in the sedimented dust were 0.4, 0.2, 0.01, 0.15, 0.02, and 6.1 kg/sq km/mo, respectively and these values were ten times higher than are found in large cities. The average sedimented dust was 0.3 ton/sq km/mo except for one location where 3.0 tons/sq km/mo was recorded.

51634

APTIC NO. 73828

Mizoguchi, N. and T. Mizokoshi

PHOTOCHEMICAL AIR POLLUTION IN OITA (REPORT I) OXIDANT CONCENTRATION IN THE FRESH AIR. (Oitachiku ni okeru kokogaku taiki osen (dai I-ho) senjo chiki ni okeru okishidanto nodo). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):556, Nov. 1974 (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 403.)

Air pollutant concentrations were measured at two locations in Oita city in 1974. Oxidants were analyzed by Kyoto Denshi OX-01, ozone by Dasibi 1003 AH, nitrogen oxides by Kyoto Denshi NX-15, and sulfur oxides by Denki Kagaku GR-3C. The average oxidants, nitrogen dioxide and sulfur dioxide concentrations from December 7 to December 10 were 46-50 ppb, 2-3 ppb and 6-11 ppb, respectively. At Kyuju highland, the oxidants concentrations were relatively stable during spring and winter but varied remarkably in summer. The unstable pollution condition in summer was attributed to the daytime east and north winds.

51635

APTIC NO. 74171

Nagumo, Kiyoshi and Kazuo Amatani

CITIZEN INVOLVEMENT AND NO₂ DETERMINATIONS. (Jumin undo to NO₂ sokuteichi). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan J. Public Health), 21(10):418, Oct. 1974. (Presented at the Japanese Society of Public Health Annual Meeting, 33rd, Fukushima, Japan, Oct. 16-18, 1974, Paper 548.)

Determinations of nitrogen dioxide, conducted by concerned citizens from Ota Ward, Tokyo, Japan during 1973 and 1974, are described. During 1972, seminars were held on the use of simple NO₂ measuring devices. In December 1973, NO₂ data were compiled for 900 locations in the ward. Values for NO₂ ranged from 0.01 ppm to 0.66 ppm, with a daily average of 0.075 ppm. In June 1974, measurements were taken at 1573 locations. From partial analysis of data (686 measurements) values for NO₂ ranged from 0.01 ppm to 0.42 ppm, with a daily average of 0.10 ppm. Environmental standards specify 0.02 ppm/day. Pollution distribution patterns were more clearly determined by the large number of measurements. Although simple measurement equipment was used, accuracy was within the range of error of measurements taken at Omori HC, when calculations were made on the basis of 4.1 micrograms nitrite ion/0.1 ppm NO₂.

51636

APTIC NO. 71636

Oda, K., T. Inoue, H. Nakano, and M. Nakano

STUDY ON AIR POLLUTION BY AUTOMOTIVE EXHAUST GAS IN OSAKA. PART 3. (Osaka ni okeru jidosha haigasutai osen no jittai to sono ichi kosatsu ni tsuite Dai-3-pu). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):486, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 332.)

To survey air pollution by automotive exhaust gas in Osaka, the concentrations of carbon monoxide, nitric oxide, and nitrogen dioxide were measured at 148 locations during 1973. At each location, measurements were made at the intersection, the roadside 100 m from the intersection, and a background area 100 m from roadside. The results were analyzed in terms of a pollution index. At roadside, the number of measuring points with pollution index above 1.0 were 24 for CO (35.8%), 31 for NO (46.3%), and 13 for NO₂ (19.4%). The CO and NO concentrations at the background area were considerably lower than those at roadside, while NO₂ concentration showed little variation indicating widespread NO₂ pollution. In Hirano, where the time zone traffic control standard was enforced, a definite decreasing trend in pollutant concentrations was observed.

51637

APTIC NO. 74111

Ohira, Toshio

AIR POLLUTION LEVELS IN VARIOUS COMMUNITIES. (Kaku jittai ni okeru taiki osen jokyō). Text in Japanese. Taiki Osen Nyūsu (Air Pollution News), no. 80, 81:45-54, Jan-March 1974.

Air Pollutant concentration data, measured at national air pollution monitoring stations throughout Japan (1970), and through a national continuous monitoring network for atmospheric pollution (1971), are tabulated. Pollutant concentra-

tions included are: sulfur dioxide; airborne particulates (including organic, heavy metal, and soluble sulfate and nitrate components); nitrogen oxides (nitric oxide, nitrogen dioxide) oxidant; carbon monoxide and hydrocarbons, excluding automobile emissions. Almost all average pollutant measurements from Kawasaki, Kanagawa Prefecture, were higher than those found anywhere else: SO₂, 0.075 ppm; total airborne dust particulates, 0.301 mg/cu m; lead, 1.46 micrograms/cu m; copper, 0.0051 mg/cu m; iron, 0.0155 mg/cu m; and soluble sulfates, 0.056 mg/cu m. Osaka and Tokyo showed the next greatest pollutant concentrations most of the time. During 1970-1971, cadmium (0.03 microgram/cu m) and zinc (0.002 mg/cu m) concentrations were highest in measurements taken on airborne particulates in Osaka. From April 1971 to March 1972, Tokyo had the highest average yearly oxidant concentration (0.040 ppm), based on hourly values. During the same time, Tokyo also had the highest average yearly (NO₂ + NO) concentration (0.230 ppm), based on hourly values.

51638

APTIC NO. 73697

Rothe, K. W.

LIDAR MEASUREMENTS OF NITROGEN DIOXIDE AND THEIR ANALYSIS. (*Lidar-Messungen an NO₂-Verunreinigungen und deren Auswertung*). Text in German. Landesanstalt fuer Immissions- und Bodennutzungsschutz des Landes Nordrhein-Westfalen, Essen (Germany), Laser-Tag., Stand Anwendungstech. Lasern Geb. Luftreinhal- tung, Essen, Germany, 1974, p. 265-271. (Oct.)

Lidar measurements of atmospheric nitrogen dioxide concentrations over Cologne and over a chemical plant are presented. A flash-pumped coumarin laser, a Cassegrain system with 60 cm diameter, a 250-channel transient recorder, and an off-line or on-line computer were used for the measurements. The average NO₂ concentration determined over Cologne during night at an altitude of about 100 m was 0.2 ppm, while the sensitivity of the lidar system amounted to 0.05 ppm. The NO₂ concentrations determined in the flue gas plume of a 120 meter stack up to 250 m high make it possible to calculate the NO₂ emission using knowledge of the stack top cross-section area. Measurements at an altitude of 50 m revealed a maximum over 3 ppm in the middle of the plant premises, and values below 0.5 ppm in the adjacent residential area.

51639

APTIC NO. 74243

Snelson, Alan

CHEMICAL COMPOSITION OF THE ATMOSPHERE AT 40,000 - 65,000 FEET USING A MODIFIED MATRIX ISOLATION TECHNIQUE (FINAL TECHNICAL REPORT). IIT Research Inst., Chicago, Ill., Air Force Contract F44620-73-C-0006, Proj. 9750-01, ITRI Rept. C6269 8, AFOSR-TR-74-1727, 72p. Sept. 24, 1974. 29 refs. NTS, DDC, AD A000574

Gas analyses of air samples collected in the 40,000 to 65,000 ft altitude range were performed for methane, ethylene, carbon dioxide, carbon monoxide, nitrous oxide, and hydrogen using a mechanical cryogenic whole air sampler flown on a RB57 aircraft. The chemical analyses were performed using a variety of chromatographic techniques. The following mixing ratios were obtained for the 60,000-64,000 ft altitude range: CH₄, 1.36 ± 0.18 ppm; C₂H₄, less than or equal to 5 ppb; CO₂, 304 ± 20 ppm; N₂O, 196 ± 40 ppb and 77 ± 48 ppb; and H₂, 0.56 ± 0.16 ppm. The feasibility of using a mechanical refrigerator to collect solid air samples at high altitudes was demonstrated.

51640

APTIC NO. 75331

Suzuki, A.

THE PRESENT STATE OF AIR POLLUTION IN JAPAN (*Nippon no taiki oken jikyo*). Japan Environmental Protection Agency, Dept. of Atmospheric Control, 4p. Dec. 1974. Translated from Japanese. Scitran Scientific Translation Service, Santa Barbara, Calif., 8p.

An introduction to data obtained from Japanese air monitoring stations during 1973 is presented. Topics outlined include: the present status of monitoring stations in Japan; changes in pollution indices for sulfur dioxide, nitrogen oxides, oxidants, hydrocarbons, carbon monoxide, and particulates; air pollution levels in urban-industrialized areas versus suburban areas; and progress in the enforcement of environmental standards.

51641

APTIC NO. 73698

Northern Colorado Univ., Greeley

ANALYSIS OF AEROSOLIZED POLLUTANTS IN FEEDLOTS AND OTHER ENVIRONMENTS (FINAL TECHNICAL REPORT). National Science Foundation Grant GY-11472, 23p., 1974.

Samples of airborne microorganisms and particulate matter from locations near cattle feedlots were analyzed. Elevated numbers of airborne bacteria were obtained at sample sites adjacent to the feedlots in comparison to samples taken elsewhere, and samples taken downwind from the feedlots were routinely higher in bacterial count than those taken upwind. The predominant bacterial groups were the Gram-positive rods, including the spore-forming organisms of the genus *Bacillus*, and the Gram-positive cocci, particularly those possessing orange, red, and yellow pigments. Gram-negative bacteria, which are commonly associated with manure and areas contaminated with fecal material, were noticeably fewer in number. Total colonies of Actinomycetes and miscellaneous organisms were distinctly higher near feedlots than at urban sites. Gram-negative bacilli were encountered most frequently in samples downwind from the feedlots. Weekly mean fungi counts were generally lower at sites downwind of feedlots as compared to those located upwind. The most frequently observed particulates at feedlot sites were particles of cow manure and sludge. Various types of pollen and spores were also observed at feedlot sites as well as at other sites.

51642

APTIC NO. 73831

Fukuoka Prefectural Government (Japan), Bureau of Public Health

GENERAL SITUATION OF THE CONTAMINATION BY THE TRACE HEAVY METALS AND ITS COUNTER-MEASURE. (*Biryo jukin-zoku tou ni yoru oken no gaikyo to taisaku*). Text in Japanese. In: 49 Nendoban Jankyo Hakusho (White Paper on the Environment in 1974), p. 236-241. Jan. 1975.

Pollution by airborne cadmium at Omuta city, Fukuoka Prefecture was investigated. The average Cd concentration measured at 9 locations ranged from 0.012 microgram/cu m at Wakamiya Hospital to 0.183 microgram/cu m at the Shinchi apartment complex in 1971, 0.009 microgram/cu m at the Yumer Technical College to 0.086 microgram/cu m at the Omuta slaughterhouse in 1972, and 0.010 microgram/cu m at the Yumer Technical College to 0.145 microgram/cu m at the Shinchi apartment complex in 1973. The overall average concentration in 1973 was 0.063 microgram/cu m, an increase of 0.019 microgram/cu m from 1972. High Cd concentration was found in rice produced in the area in 1969. Physical examinations of more than 5000 residents including farmers, fishermen, and others in 1972 revealed no Cd poisoning cases.

51643

APTIC NO. 73835

Fukushima Prefectural Government (Japan), Div. of Life and Environment, Section of Environmental Pollution

ENVIRONMENTAL POLLUTION IN FUKUSHIMA PREFECTURE IN 1974. PRESENT SITUATION OF AIR POLLUTION. (*Fukushima no kogan Taiki oken no genkyo*). Text in Japanese, p. 5-40. 1974.

The present status of air pollution in Fukushima Prefecture is reviewed. Data on emission quantity (5759.2 cu m), maximum one-hour value (0.08-0.15 ppm), and daily average (0.033-0.13 ppm) of sulfur oxides concentrations are compiled and analyzed in reference to regional characteristics. Data on

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falling particulates (2-23 ton/sq km/mo) and suspended particulate (yearly average 0.02-0.07 mg/cu m) concentrations and hydrogen fluoride concentration (maximum daily average 0.6-7.1 ppb) are also given. Meteorological conditions associated with high oxidant concentration are described. The oxidant concentration on days when smog forecasts or warnings were issued and diurnal variation in oxidant concentration are given and analyzed in relation to meteorological conditions. The pollution caused by automobile traffic was investigated by measuring carbon monoxide and suspended particulate concentration and analyzed in relation to wind direction, wind velocity, and traffic volume. Regional characteristics of SOx and suspended particulate pollution are also analyzed.

51644

APTIC NO. 73837

Kumamoto Prefectural Government (Japan), Bureau of Public Health

AIR POLLUTION. (Taiki osen). Text in Japanese. Kumamoto ni Okeru Kogai Chosa Hokoku (Survey Report on the Environmental Pollution in Kumamoto City), no. 8:19-72, July 1974.

Air pollution measurement results at Kumamoto city in 1973 are given. The average sulfur dioxide concentration (conductivity method) at the Kumamoto municipal building ranged from 0.017 ppm in November to 0.29 ppm in December. The highest 1-hour value was 0.148 ppm in December. Measurements of SO₂ concentrations by lead dioxide method at 20 locations showed the highest average concentration of 0.56 sulfur trioxide mg/day/100 sq cm at Tomiyoshi. The average total dust concentrations (soluble + insoluble) measured at 6 locations ranged from 1.59 ton/sq km/mo in May to 7.33 ton/sq km/mo in July. The highest average concentration was 5.87 ton/sq km/mo at Shimuzu Yakuruto Co. The average airborne particulates concentration at the municipal building was 62.46 microgram/cu m. The monthly average carbon monoxide concentration at the municipal building was 4.3 ppm and the highest 1-hour value was 16.6 ppm in June. The monthly average nitrogen oxide concentration by Saltzman method was 0.063 ppm and the highest daily average concentration was 0.260 ppm. The monthly average hydrocarbon concentration was 2.5 ppm and the highest one-hour value was 10.0 ppm.

51645

APTIC NO. 74049

Meguro Municipal Government (Japan), Construction and Public Nuisance Div.

PRESENT STATUS OF AIR POLLUTION. (Taiki osen no genjo). Text in Japanese. In: Environmental Pollution in the Meguro Ward, p. 24-43, Dec. 1974.

Air pollutants measured from August 1973 to January 1974 in the Meguro ward of Tokyo are reported. The average nitrogen dioxide, nitric oxide, oxidants and sulfur dioxide concentrations measured at 22 locations ranged from 0.013 to 0.043 ppm, 0.005 to 0.019 ppm, 0.016 to 0.042 ppm, and 0.009 to 0.015 ppm, respectively. The average carbon monoxide concentration measured at 11 busy intersections from April 1973 to March 1974 on a specific day each month ranged from 9.0 ppm at Aobadai Ichome to 13.4 ppm to Tamichi Elementary School. The average lead concentration in air at four locations was 2.0 micrograms/cu m. Countermeasures for SOx in Tokyo are enforced by restricting the use of oil with a high sulfur content and installation of desulfurization equipment on large boilers.

51646

APTIC NO. 74100

Kyoto City (Japan), Dept. of Environmental Pollution Countermeasures

ON CONCENTRATIONS OF SULFUR OXIDES, ETC. DURING YEAR-END HOLIDAYS. (Nenmatsu nenshi ni okeru iou sankabutsu nodo tou ni tsuite). Text in Japanese. In: Kyoto-shi Ni Okeru Kogai Gyosei No Ayumi: Kogai Kankei Koho Shiryoshu, p. 42-43, Feb. 4, 1974.

Measurements of atmospheric sulfur oxides, in Kyoto, taken from Dec. 29, 1973 to Jan. 4, 1974, were compared to values obtained during the same days in 1972-1973. Most major industrial pollution sources shut down over the holidays. For a 7-year average (from 1966-1972), concentrations of sulfur oxides dropped steadily from Dec. 29-Jan. 2 (0.05-0.02 ppm). Thereafter, increases occurred on Jan. 3 and 4. In 1973-1974, there was hardly any change in the daily average (0.02-0.03 ppm) during this time. The influence of meteorological conditions is suggested for the differences in readings. Because of the strengthening of fuel control laws, stack emission desulfurization equipment has been installed in 31 plants out of 996 smoke sources. Of 293 plants which did not meet fuel standards, 144 plants have since converted to low sulfur heavy oil.

51647

APTIC NO. 74101

Kyoto City (Japan), Dept. of Environmental Pollution Countermeasures

ON SURVEY RESULTS OF ATMOSPHERIC CARBON MONOXIDE (CO) CONCENTRATIONS ON STREETS. (Gairo kukichu no issanka tanso (CO) nodo chosa no kekka ni tsuite). Text in Japanese. In: Kyoto-shi ni Okeru Kogai Gyosei no Ayumi: Kogai Kankei Koho Shiryoshu, p. 49-51, Feb. 22, 1974.

A daytime survey of atmospheric carbon monoxide (CO) concentrations in Kyoto City, Japan was conducted in August 1974, at 95 street locations and 10 municipal monitoring stations. Sampling bags were used to collect 1-hour samples for a continuous period of 8 hr. Eight-hour average CO values ranged from 0.9-12.0 ppm, and did not exceed national environmental standards (below 20 ppm). A maximum 1-hour value of 28.9 ppm CO was recorded, and 12 locations reported values above municipal environmental standards (1-hour value below 10 ppm). The average CO value for 15 highway locations was 5.0 ppm; values ranged from 2.4-8.7 ppm. Since Oct. 1972, the average value of CO for the entire city has been more or less constant; the Aug. 1974 value was 4.6 ppm. About 25% of the CO concentration measurements fell between 3.0-3.9 ppm.

51648

APTIC NO. 74102

Kyoto City (Japan), Dept. of Environmental Pollution Countermeasures

ON 1973 SURVEY RESULTS ON PHOTOCHEMICAL SMOG. (Showa 48-nendo kokagaku sumoggu chosa kekka ni tsuite). Text in Japanese. In: Kyoto-shi ni Okeru Kogai Gyosei no Ayumi: Kogai Kankei Koho Shiryoshu, p. 57-60, March 22, 1974.

A survey of hydrocarbons, ozone, formaldehyde, acrolein, and PAN (peroxyacetyl nitrate) was conducted at 4 locations in Kyoto City, Japan in August 1973. Hydrocarbons found in concentrations over 100 ppb were isopentane, n-pentane, hexane, and cyclohexane. The existence of isobutane, n-butane, acetylene, isomeric methylpentane, and isomeric methylhexane was observed. Most of these hydrocarbons are major gasoline components. Hydrocarbon concentrations decreased when total oxidant concentrations peaked near noon, and increased with decreases in total oxidants. Ozone (33-69 ppb) and formaldehyde (12-37 ppm) concentrations showed dependence on total oxidant (35-110 ppb) concentrations. Acrolein concentrations were about 10 ppb all the time, except for one high value of 32 ppb. Both formaldehyde and acrolein concentrations pose no human health hazards. No PAN was detected. Ozone comprised about 70% of total oxidant concentrations in comparison to values for Tokyo (80-90% of oxidant), and Los Angeles (over 90% of oxidant).

51649

APTIC NO. 74173

Tokyo Metropolitan Dept. of Public Health (Japan)

SURVEY ON EFFECT OF AIR POLLUTION ON LIFE ENVIRONMENT 1972. (Showa 47-nendo taiki osen ni kakaru seikatsu kankyo chosa: shukei, kaiseiki). Text in Japanese. 44p., March 1974.

Concentrations of atmospheric sulfur oxides and nitrogen oxides were measured at 30 monitoring points in Tokyo throughout 1972 (from April 1972 to March 1973). The average yearly concentration (0.019 ppm) of sulfur oxides remained the same for 1971 and 1972. In 1972, average monthly concentrations ranged from 0.001-0.066 ppm. Mobile monitoring units uncovered localized areas of high pollutant (SO_x, NO_x) concentrations. Nitrogen oxides were measured as nitrogen dioxide and nitric oxide. Average yearly concentrations of NO and NO₂ were both about 0.063 ppm for 1972. Concentrations of NO₂ met environmental standards only 10% of the time. There was much regional variation in concentrations of NO₂ and NO. Seasonal variations of NO and NO₂ showed lowest concentrations during summer, and highest during winter. The combined Meguro, Shinagawa, and Omori Wards had the highest NO₂ concentrations (yearly average, 0.075 ppm); adjoining wards also had NO₂ concentrations over 0.07 ppm. Out of 94 days, when NO₂ concentrations were above 0.15 ppm, there were 29 days on which complaints about photochemical smog were registered. Out of 33 days on which oxidant concentrations were above 0.15 ppm, complaints were registered on 30 days.

51650

APTIC NO. 75179

Office of Air and Waste Management, Research Triangle Park, N. C., National Air Data Branch

AIR QUALITY DATA - 1973 ANNUAL STATISTICS (ANNUAL REPORT). Rept. EPA-450/2-74-015, 160p., Nov. 1974. 4 refs.

NTIS: PB 241 808/AS

Ambient air quality data submitted to the Environmental Protection Agency by state, local, and Federal monitoring networks are reported. The data represent all ambient air quality concentrations for pollutants that currently have National Ambient Air Quality Standards, viz., particulates, sulfur oxides, carbon monoxide, nitrogen dioxide, photochemical oxidants, and hydrocarbons (nonmethane). Each summary line of data is preceded by the Air Quality Control Region within which the sampling site is located, the city or county samples, the three-digit site number within the city or county, and an Agency Type Code that indicates the type of agency responsible for the laboratory analysis. A Project Code is shown with the Agency Type Code to indicate the type of surveillance being conducted.

51651

APTIC NO. 75349

Office of Air and Waste Management, Research Triangle Park, N. C., National Air Data Branch

AIR QUALITY DATA - 1973 FOURTH QUARTER STATISTICS (QUARTERLY REPORT). Rept. EPA-450/2-74-014, 135p., Nov. 1974. 3 refs.

NTIS: PB 241807/AS

A summary of all 1973 fourth quarter air quality data submitted to the Environmental Protection Agency National Aerometric Data Bank (NADB) by state, local, and Federal monitoring networks is presented. The data pertain to all pollutants that currently have National Ambient Air Quality Standards, viz., particulate matter, sulfur oxides, carbon monoxide, nitrogen dioxide, photochemical oxidants, and hydrocarbons (nonmethane). Each summary line of data is preceded by the Air Quality Control Region within which the sampling site is located, the city or county within that region, the three-digit site number within the city or county, and an Agency Type Code that indicates the type of agency responsible for the laboratory analysis. A Project Code is shown with the Agency Type Code to indicate the type of surveillance being conducted. Both parametric and non-parametric indices of air quality are given. The number of observations, the minimum and maximum value measured for the period of record, and the odd deciles plus the 95th and 99th percentiles describe the distribution of observed values. Arithmetic and geometric means and standard deviations provide some measure of central tendency and dispersion.

1973

51652

APTIC NO. 73729

Badakhshan, A.

TECHNIQUES AND EXPERIENCES OF MEASUREMENT AND OBSERVATION OF MAJOR ATMOSPHERIC POLLUTANTS IN IRAN. *World Meteorological Organization, Geneva (Switzerland) and World Health Organization, Geneva (Switzerland), World Meteorol. Organ./World Health Organ. Tech. Conf. Observ. Meas. Atmos. Pollut., Helsinki, Finland, 1973, p. 236-248, WMO-368. 17 refs. (July 30-Aug. 4, Paper N75 11500.)*

NTIS: N75-11476-540

Levels of major atmospheric pollutants in Iran are discussed along with monitoring techniques employed. Sulfur dioxide levels as measured with the hydrogen peroxide method peaked at 280 micrograms/cu m between 1966 and 1972, with an overall median value of about 40 micrograms/cu m. Concentrations obtained with the pararosaniline colorimetric method were consistently lower than those obtained by the hydrogen peroxide method for unknown reasons. Lead peroxide candles gave similar SO₂ monthly average concentrations to those obtained with the H₂O₂ method. Thin-layer chromatographic and fluorometric methods identified seven polycyclic hydrocarbons, with the benzo(3,4)pyrene content averaging 6.33 micrograms/1000 cu m of air. Total hydrocarbons ranged from 4-8 ppm during the period April 1972- March 1973. A maximum monthly average soiling index value of 4.44 was obtained during November 1972. Particulate matter collected with high-volume samplers ranged from 150-4000 micrograms/cu m (monthly mean) for the period January to December 1972. Dust fall over the period 1967 to 1972 varied from 430 to 3678 tons/sq mi. The overall median value for carbon monoxide was 20 ppm colorimetrically. Very low concentrations of oxidants, nitrogen oxides, and hydrogen sulfide were measured.

51653

APTIC NO. 73723

Berljand, M. E., A. S. Zaitsev, N. S. Volberg, and V. I. Anufriev

BASIC PRINCIPLES OF DETERMINING ATMOSPHERIC POLLUTION IN THE USSR. *World Meteorological Organization, Geneva (Switzerland) and World Health Organization, Geneva (Switzerland), World Meteorol. Organ./World Health Organ. Tech. Conf. Observ. Meas. Atmos. Pollut., Helsinki, Finland, 1973, p. 125-133, WMO-368. 21 refs. (July 30-Aug. 4, Paper N75 11489.)*

NTIS: N75-11476-540

Air pollution monitoring activities in the USSR are reviewed. Monitoring is being performed to assess urban concentrations of pollutants, to study the diffusion of pollutants from large individual sources, and to estimate background air pollution levels downwind from industrial areas. An automatic air pollution monitoring system consisting of standard monitoring stations and a data collection center is now in operation. The system comprises 10 monitoring stations which contain gas analyzers for sulfur dioxide and carbon monoxide. Meteorological instrumentation is also included. Data from the monitoring stations reaches the data collection center via local telephone lines. Calculations for sulfur dioxide reveal two types of winter concentration distributions. One concentrations cycle is largely determined by the direct effects of emissions from industrial plants, while the second cycle is largely associated with comparatively small and scattered emission sources. Dispersion of carbon monoxide from areas of heavy traffic is small.

51654

APTIC NO. 73728

Bigler, S. G., K. MacKenzie, and R. A. Willis

AIR POLLUTION CONDITIONS IN FAIRBANKS, ALASKA. *World Meteorological Organization, Geneva (Switzerland) and World Health Organization, Geneva*

AIR QUALITY MEASUREMENTS

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(Switzerland), World Meteorol. Organ./World Health Organ. Tech. Conf. Observ. Meas. Atmos. Pollut., Helsinki, Finland, 1973, p. 188-195, WMO-368. 11 refs. (July 30-Aug. 4, Paper N75 11495.)

NTIS: N75-11476-540

Meteorological conditions affecting air pollution in the Fairbanks, Alaska area are reviewed. Nighttime temperature inversions formed by radiational cooling of the land surface are present on most summer nights but are usually destroyed by the warm afternoon sun. Ice fog is a visible indicator of winter inversions when the temperature is colder than about -30 C. The ice fog results from the combination of water vapor and man-made pollution generated by combustion activities. Carbon monoxide concentrations in Fairbanks exceed National Ambient Air Quality Standards about 72% of the days during the November-March period. Particulate levels at downtown sites average 275 micrograms/cu m during the winter, and the geometric mean diameter of the particles is about 2.8 micron. The annual average airborne lead concentration for Fairbanks is 3.17 micrograms/cu m, ranking third highest in the United States.

51655

APTIC NO. 73742

Grass, R. D.

OBSERVATIONS OF TOTAL OZONE WITH DOBSON SPECTROPHOTOMETERS. World Meteorological Organization, Geneva (Switzerland) and World Health Organization, Geneva (Switzerland), World Meteorol. Organ./World Health Organ. Tech. Conf. Observ. Meas. Atmos. Pollut., Helsinki, Finland, 1973, p. 413-422, WMO-368. 7 refs. (July 30-Aug. 4, Paper N75 11519.)

NTIS: N75-11476-540

The use of the Dobson spectrophotometer for total ozone measurements is discussed along with trends in the ozone level over the North American continent derived from data obtained during the 1961-1970 period. The Dobson ozone spectrophotometer measures ozone by comparing the relative intensities of selected pairs of wavelengths in the Huggins ozone absorption band. Total ozone data obtained with the Dobson spectrophotometer at 10 North American stations indicate an ozone increase from 1961 to 1970 which varies from 1.0 + or - 1.2%/decade at Green Bay to 8.8 + or - 0.7%/decade at Nashville. The ozone increase is related to the change in the general character of the Rossby wave structure that occurred over eastern North America during the 1960 s.

51656

APTIC NO. 73732

Kelley, J. J.

BASELINE OBSERVATIONS OF ATMOSPHERIC TRACE GASES IN THE ARCTIC ATMOSPHERE OF NORTH AMERICA. World Meteorological Organization, Geneva (Switzerland) and World Health Organization, Geneva (Switzerland), World Meteorol. Organ./World Health Organ. Tech. Conf. Observ. Meas. Atmos. Pollut., Helsinki, Finland, 1973, p. 265-275, WMO-368. 15 refs. (July 30-Aug. 4, Paper N75 11503.)

NTIS: N75-11476-540

Baseline measurements of atmospheric trace gases in the Arctic atmosphere of North America are reported. Carbon dioxide showed a distinct seasonal variation, with the monthly average concentration being high in the winter and low in the summer. The record of CO₂ at Barrow, Alaska was sufficient to detect a long-term secular trend of 0.6 ppm prior to 1963 and 1.0 ppm after 1965. Seasonal variations in ozone were also seen, with daily concentrations varying from nearly 0.07 ppm to less than 0.01 ppm. Carbon monoxide concentrations were consistently low, varying from 55-260 ppb. The mean methane concentration was 1.59 ppm which compared with the estimated worldwide range of 1.2-1.5 ppm. The presence of natural gas in Barrow may be responsible for the observed concentration.

51657

Kellner, K. H.

FINDINGS FROM THE SULPHUR DIOXIDE SURVEY AT THE REFINERY CENTRE INGOLSTADT-NEUSTADT. World Meteorological Organization, Geneva (Switzerland) and World Health Organization, Geneva (Switzerland), World Meteorol. Organ./World Health Organ. Tech. Conf. Observ. Meas. Atmos. Pollut., Helsinki, Finland, 1973, p. 176-187, WMO-368. (July 30-Aug. 4, Paper N75 11494.)

NTIS: N75-11476-540

Ambient sulfur dioxide levels in a valley populated by several crude oil refineries were measured and correlated with various meteorological parameters. Seasonal variations in SO₂ concentrations showed a pronounced peak during the winter months which was due to a combination of increased energy consumption and inversion-type situations with little vertical exchange. Sulfur dioxide levels in the summer were higher when the wind was blowing from the direction of the industrial complex, whereas during the winter little difference was noted in SO₂ levels during different wind patterns. There was a direct relationship between the frequency of inversions and SO₂ levels, with the peak SO₂ levels reaching 0.47 micrograms/cu m during inversion conditions. The dispersion of SO₂ from the refinery stacks was much greater than that calculated for meteorological conditions similar to those occurring.

51658

APTIC NO. 73747

Manes, A., M. Rindsberger, D. Guetta, and A. Teitelman

DETERMINATION OF LONG-TERM TRENDS OF PARTICULATE AIR POLLUTION FROM VISIBILITY DATA. World Meteorological Organization, Geneva (Switzerland) and World Health Organization, Geneva (Switzerland), World Meteorol. Organ./World Health Organ. Tech. Conf. Observ. Meas. Atmos. Pollut., Helsinki, Finland, 1973, p. 516-525, WMO-368. 8 refs. (July 30-Aug. 4, Paper N75 11528.)

NTIS: N75-11476-540

Visibility data obtained at the Lod International Airport in the Tel-Aviv area over the period 1951-1970 are presented along with trends in particulate pollution. The average visibility dropped from about 22 km in 1956 to around 10 km in 1970; no pronounced trend was observed for the 1951-56 period. Standard deviations also showed a slightly decreasing trend which appeared to be in agreement with the deteriorating visibility trend due to the accumulation of man-made particulate pollutants in the summer. The trend in reduced visibility over the 20-year period paralleled a rapid growth of population, industrial activity, and number of motor vehicles in the Tel-Aviv metropolitan area.

51659

APTIC NO. 74264

Matsumura, Toshiro

SUMMARY OF OXIDANTS AND UV LEVELS IN URBAN ATMOSPHERE. (Toshi taikichu no okishidanto oyobi shigaisen reberu). Text in Japanese. Kogai to Taisaku (J. Pollution Control), 9(7):75-80, 1973.

Measurement of oxidant and ultraviolet ray levels was initiated in May 1971 on the roof of a six story building of the Ministry of Health and Welfare. The results of observations between May and December 1971 are summarized. Oxidant was measured by neutral potassium iodide solution and spectrophotometry with measurement limits of 0-0.5 ppm. No adjustments were made for nitric oxide and nitrogen dioxide. Ultraviolet rays were measured by a horizontal areal ray meter with the range of 310-400 nm and 700-1200 nm. Oxidant measurements were taken 4331 individual times involving 182 days, and the minimum of hourly figures was 0.1 ppm, the maximum 28.5 ppm, the daily average minimum 2.7 ppm, maximum 4.5 ppm, and the yearly average 3.7 ppm. The peak tendency for daily fluctuations of oxidants was around noon for July to September, but two small peaks occurred

around noon and at night for October to December. For UV rays, the peak appeared at 1 pm for spring and summer but about noon between October and December. Generally, the hourly figures for oxidants were within 0.1 and 28.5 pphm, and the ratio of daily maximum of more than 20 pphm for the year was 4%, and that for more than 10 pphm was 1%. The UV rays were strong in summer, with a maximum of 877.5 nw min/sq cm, the total daily UV quantity maximum was 2512.5 mw min/sq cm, and the maximum monthly average of the daily total UV was 1599.4 nw min/sq cm and all occurred in August. Photochemical oxidants occurred on sunny or cloudy days with relatively strong UV of more than 1100 mw min/sq cm daily average, and when the average temperature 8 am and 4 pm was more than 25 C, and the average humidity was 57-74%. The wind velocity was less than 4 m/sec. Significant correlations between oxidants and UV ray and between oxidants and formaldehyde were noted on the days of more than 15 pphm oxidants level.

51660

APTIC NO. 74134

Nakane, Hoichi, Masakazu Moriyama, Kie Yokota, and Takeji Miyazaki

AIR POLLUTION IN A SEMI-SEALED SPACE - CO POLLUTION INVESTIGATION AT THE OSAKA STATION EASTERN ENTRANCE BRIDGE. (*Han mippei kukan ni okeru kuki osen, osakaeki higashiguchi gado shita deno jidosha haigasu ni yoru CO osen chosa*). Text in Japanese. Preprint, Japan Inst. of Architecture, p. 209-210, 1973. (Presented at the Japan Institute of Architecture Annual Meeting, Oct. 1975.)

Measurements of carbon monoxide concentration, wind direction, wind velocity, temperature, and traffic number were carried out for 16 days between April 24 and May 23, 1973 at the Osaka station eastern bridge entrance. The CO concentrations were high between 9:00 - 11:00 am and 5:00 - 7:00 pm and low between 3:00 - 5:00 am. The 90% range values showed much the same trend. There was no significant change in the total traffic number during the day time. The north-bound traffic was about 1.5 to 2 times that of south-bound traffic, and the CO concentration on the eastern side of the bridge was 1.5 to 2 times higher than that on the western side. The CO concentration and temperature under the bridge increased with increasing height. The CO concentration outside the bridge was significantly lower, presumably due to rapid diffusion.

51661

APTIC NO. 73749

Olsson, Lars E., Christer Persson, Arne Hagard, Hans Ottersten, Lennart Granat, and Claes Tragardh

MEASUREMENTS OF METEOROLOGICAL PARAMETERS AND AIR POLLUTION SPREAD OVER STOCKHOLM, SWEDEN, BY MEANS OF REMOTE SENSING AND AIRBORNE INSTRUMENTATION.

World Meteorological Organization, Geneva (Switzerland) and World Health Organization, Geneva (Switzerland), World Meteorol. Organ./World Health Organ. Tech. Conf. Observ. Meas. Atmos. Pollut., Helsinki, Finland, 1973, p. 545-556, WMO-368. 9 refs. (July 30-Aug. 4, Paper N75 11531.)

NTIS: N75-11476-540

Various remote sensing techniques and airborne measurements were used to measure meteorological parameters and air pollution over Stockholm, Sweden during the winter of 1973. Instantaneous lidar return correlated well with aerosol profiles measured from aircraft as did continuous integrating nephelometer profiles with particle counter data. An inversion based at approximately 300 m was identified with an associated decrease in aerosol concentration, with particle counts decreasing from more than 30,000/cu cm in the mixing layer to less than 500 cu cm above the inversion. Average sulfur dioxide concentrations of 46 micrograms/cu m and sulfate concentrations of 11 micrograms/cu m were recorded in an apparently well mixed layer over and downwind of the city. Although some unexplained temporal and spacial variability in

SO₂ and sulfate concentrations occurred, most of the 30 measurements made were consistent relative to each other and to the meteorology.

51662

APTIC NO. 74213

Saijo, Tatsuya and Takeshi Nozaki

FACT-FINDING SURVEY FOR OFFENSIVE ODOR. (*Shuki jittai chosa*). Text in Japanese. In: Ibaraki-ken Research Center Annual Report on Environmental Pollution. Rept. 6, p. 83-93, 1973.

Odor surveys at two poultry farms, five pig farms, two feather mills, two fish-meal plants, two leather plants, and one paper mill were conducted. The odor intensity was measured along with the concentrations of hydrogen sulfide, methyl mercaptan, methyl sulfide, ammonia, and trimethylamine. Malodors from poultry farms were caused by a complex mixture of NH₃, methyl mercaptan, volatile amines, and volatile fatty acids. Malodorants at pig farms were NH₃, H₂S, and methyl mercaptan. Malodorants from feather mills were NH₃, trimethylamine, and methyl mercaptan. The primary malodorants at fish-meal plants were NH₃, trimethylamine, and methyl mercaptan. All malodorants except (CH₃)₂S were found at leather plants. Sulfur odors were dominant at paper mills.

51663

APTIC NO. 74196

Sekido, Shozaburo, Yoichi Ota, Yoko Arai, Ryoji Okura, Yoshikazu Nakane, and Kei Yokota

THE UNDERGROUND ARCADE ENVIRONMENT IN OSAKA, ESPECIALLY THE STATE OF THE AIR - NO 1: THE OLD AND THE NEW UMEDA UNDERGROUND ARCADES. (*Osaka shinaino chikagai kankyo, tokuni sono kukisei jo ni tsuite (sono 1 kyu umeda oyobi shin umeda chikagai ni tsuite)*). Text in Japanese. Preprint, Japan Inst. for Architecture, p. 215-216, 1973. (Presented at the Japan Institute for Architecture Annual Meeting, Oct. 1973.)

Air pollutants in the air of arcades in Osaka were measured. Carbon dioxide was measured by a detector tube, bacteria by a pinhole sampler and the falling bacteria method, dust by tape samplers and a digital dust meter, carbon monoxide by an infrared analyzer, sulfur dioxide by an electroconductivity method, nitrogen oxides by the Saltzman method, heavy metals by a high volume sampler and atomic absorption, and tar concentration by a high volume sampler and n-hexane extraction. The CO₂ and CO concentrations in the Old Umeda arcade were generally higher than those of the outside air; dust concentrations were comparable. Carbon dioxide concentrations higher than 0.1% were recorded for 21 out of 155 samples taken from the arcade. Dust concentrations in the New Umeda arcade were lower than those for outside air due to effective dust removal by air conditioners. The CO concentration in New Umeda arcade was higher than that in outside air.

51664

APTIC NO. 74210

Sekido, Shozaburo, Yoichi Ota, Yoko Arai, Ryoji Okura, Noboru Saito, Yoshikazu Nakane, and Kei Yokota

THE UNDERGROUND ARCADE ENVIRONMENT IN OSAKA ESPECIALLY THE STATE OF THE AIR - NO. 2: THE ABENO BRIDGE UNDERGROUND ARCADE AND THE RAINBOW STREET, OR THE SOUTHERN UNDERGROUND ARCADE. (*Osaka shinai no chikagai kankyo tokuni sono kukisei jo ni tsuite sono ni abeno hashi chikagai, minami chikagai (niji no machi) ni tsuite*). Text in Japanese. Preprint, Japan Inst. of Architecture, p. 217-218, 1973. (Presented at the Japan Institute for Architecture Annual Meeting, Oct. 1973.)

Measurements of carbon monoxide in air supplying in Abeno bridge underground arcade on January 31 to February 1, 1972 showed concentrations ranging from 1 ppm to 10 ppm, with a pattern similar to that at ground level. The dust concentration in the arcade air was lower than that at the ground level. Car-

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bon monoxide concentrations in the Minami underground arcade were measured from February 2 to February 23, 1972 and reached a maximum of 6 ppm which was consistent with the outside ground level air. The CO concentration in the arcades was dependent on the wind velocity at ground level and was as high as 23 ppm during heavy traffic periods. Dust, sulfur dioxide and bacteria were largely removed from arcades by filters and electric precipitators; carbon monoxide was not removed effectively.

51665

APTIC NO. 73738

Zoller, W. H., E. S. Gladney, R. A. Duce, and G. L. Hoffman

TRACE METALS IN THE ANTARCTIC ATMOSPHERE.

World Meteorological Organization, Geneva (Switzerland) and World Health Organization, Geneva (Switzerland), World Meteorol. Organ./World Health Organ. Tech. Conf. Observ. Meas. Atmos. Pollut., Helsinki, Finland, 1973, p. 380-386, WMO-368. 18 refs. (July 30-Aug. 4, Paper N75 11515.)

NTIS: N75-11476-540

An extensive air sampling program conducted at McMurdo and South Pole Stations in Antarctica between October and December of 1970 resulted in the analysis of 22 trace elements. Anomalous enriched elements found were zinc, copper, antimony, lead, selenium, and bromine. Pollution was one of the possible sources of the enrichments, with lead and bromine being possibly due in part to the combustion of leaded gasoline. Bromine and selenium may also have gas phase sources since many of their compounds exhibit very high vapor pressures.

51666

APTIC NO. 74118

Musashino Municipal Office (Japan) Section of Environmental Pollution Control

PRESENT SITUATION OF THE PUBLIC NUISANCE.

(Kogai no genjo). Text in Japanese. In: *Environmental Pollution at Musashino City*. p. 13-39, 1973.

The percentage of days/mo when pollutant concentrations met the environmental standards in Musashino Japan were 99.9-100 % for sulfur dioxide (0.1 ppm), 0.37.0 % for nitrogen dioxide (0.02 ppm) and 74.7-98.6 % for oxidants (0.06 ppm) during the period of April 1973 to March 1974. Data on SO₂ concentrations in Musashino and surrounding areas and variations in monthly averages during 1971, 1972, and 1973 are compiled. The meteorological conditions associated with high pollutant concentration are analyzed in terms of turbulent diffusion, wind direction, wind velocity, and atmospheric stability. Data on number of smog warnings issue, are also compiled and analyzed in relation to meteorological conditions. Diurnal variations in nitric oxide and NO₂ concentrations associated with high oxidant concentrations (higher than 0.15 ppm) are illustrated.

1971

51667

APTIC NO. 75324

Ishikawa Prefectural Government (Japan), Pollution and Environment Div.

WHITE PAPER ON POLLUTION, ISHIKAWA PREFECTURE, 1971. (Ishikawa ken kogai hakusho, showa 46 nendo), p. 2-27 and 73-88, 1971. Translated from Japanese. Scitran Scientific Translation Service, Santa Barbara, Calif., 53p.

Pollution trends and abatement measures for Ishikawa Prefecture, Japan are reviewed. Increasing trends in sulfur dioxide are observed, as evidenced by a 0.17 mg sulfur trioxide/sq km/mo value for 1966 versus a value of 0.31 mg for 1970. Dust particles are decreasing and range from 10-33 ton/sq km/mo for the city of Kanazawa. Continuous monitoring of SO₂ and dust is being performed at 21 sites in the prefecture; carbon monoxide recording devices are installed at major intersections

of Kanazawa and Komatsu to measure the volume of automobile exhaust. No standards are in effect for odor emissions which originate mainly from cattle breeding operations. Continuous measurements of airborne manganese are also being pursued in response to complaints in the vicinity of diatom earth plants producing fire-resistant hearth materials. Airborne lead levels reaching 4.2 micrograms are being recorded at the Rolumai-cho intersection where automobile traffic is heavy.

1969

51668

APTIC NO. 74043

Junge, C. E., Elmer Robinson, and F. L. Ludwig

A STUDY OF AEROSOLS IN PACIFIC AIR MASSES. *J. Appl. Meteorol.*, 8(3):340-347, June 1969. 15 refs.

Aerosols in Pacific air masses over Cape Blanco and Crater Lake, Oregon were measured with a Royco light-scattering particle counter and with condensation nuclei counters. Size distributions at Crater Lake (2200 m altitude) were all approximated by power law distributions with exponents between 3 and 4. Cape Blanco data agreed well with earlier measurements of sea-spray aerosol size distributions. Aitken nuclei concentrations over Crater Lake were generally greater than 1000/cu cm, a rather high level for air masses of maritime origin. The Cape Blanco data showed greater deviations from the power law representation than did the Crater Lake data, and concentrations generally increased monotonically with decreasing particle radius. Sulfur-to-chloride ratios of about 8 were observed at Crater Lake, and significant amounts of sea-spray did not appear to penetrate upward to altitudes greater than 2000 m. The aerosols observed at 2000 m tropospheric level appeared to be aged aerosols from continental sources. High altitude tropospheric aerosols were also observed at Crater Lake during periods of subsidence, and their concentrations were lower than those found under other synoptic weather conditions. The power law representations for subsidence aerosols showed lower exponential values than those for the lower altitude tropospheric aerosols. (Author abstract modified)

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1975

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APTIC NO. 73974

Alkezweeny, A. J.

EVOLUTION OF THE ST. LOUIS AEROSOL SIZE DISTRIBUTION. In: *Pacific Northwest Laboratory Annual Report for 1974 to the USAEC Division of Biomedical and Environmental Research. Part 3: Atmospheric Sciences. Battelle Memorial Inst., Richland, Wash., Pacific Northwest Labs., Rept. UC-11, p. 65-69, Feb. 1975. 8 refs.*

NTIS: BNWL-1950 PT3

Particle size distribution (0.003-5 micron particle diameter) was measured as a function of time in a parcel of air over St. Louis, using an instrumented aircraft and a tetraon to trace the air parcel trajectory. Pronounced changes in the particle size distribution were observed, with the concentration of particles below about 0.06 micron decreasing with time and the concentrations of larger particles increasing with time. The mass concentration also increased with time. Gas to particle transformations involving existing nuclei appear to play an important role in the growth of particles in the St. Louis plume. (Author conclusions modified)

51670

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APTIC NO. 73759

Auer, August H., Jr.

CALCULATIONS OF DIVERGENCE FROM THE WIND FIELD OVER AN URBAN AREA. Preprint, Wyoming Univ., Laramie, Dept. of Atmospheric Science, 3p., 1975. 4 refs. (Presented at the Wind Engineering Research, 2nd, U. S. National Conference, Fort Collins, Colo., 1975.)

Airborne observations of the mesoscale wind patterns over the Metropolitan St. Louis area reveal slight cyclonic curvature and speed reductions, accounting for a net divergence of approximately $-0.00003/\text{sec}$ below 1 km. As a first approximation, kinematically derived vertical velocities of 1-3 cm/sec over the metropolitan area seem to be of sufficient strength to explain the observed mixing layer doming of several hundred meters over the urban area. (Author conclusions modified)

51671

APTIC NO. 73972

Clark, G. H. and L. L. Wendell

MICROSCALE LOW WIND SPEED TRANSPORT AND DISPERSION CALCULATIONS. In: Pacific Northwest Laboratory Annual Report for 1974 to the USAEC Division of Biomedical and Environmental Research. Part 3: Atmospheric Sciences. Battelle Memorial Inst., Richland, Wash., Pacific Northwest Labs., Rept. UC-11, p. 56-58, Feb. 1975. 4 refs.

NTIS: BNWL-1950 PT3

A mesoscale atmospheric transport and dispersion model was modified for microscale application to distance of 300 m downwind of a pollution source. Preliminary results from three light wind dispersion tests revealed significant inhomogeneity in the prevailing wind fields. A comparison of vertical and horizontal diffusion parameters calculated from wind turbulence intensities with measured diffusion parameters showed good agreement. (Author abstract modified)

51672

APTIC NO. 73979

Dana, M. Terry

BELOW CLOUD PRECIPITATION SCAVENGING OF POLLUTANT PLUMES: EFFECT OF NONVERTICAL PRECIPITATION ON DEPOSITION PATTERNS. In: Pacific Northwest Laboratory Annual Report for 1974 to the USAEC Division of Biomedical and Environmental Research. Part 3: Atmospheric Sciences. Battelle Memorial Inst., Richland, Wash., Pacific Northwest Labs., Rept. UC-11, p. 91-98, Feb. 1975. 3 refs.

NTIS: BNWL-1950 PT3

The effect of nonvertical precipitation on the deposition pattern of material during below-cloud precipitation scavenging of pollutant plumes is discussed in relation to the traditional treatment of such scavenging. Precipitation particles are traditionally assumed to fall vertically, and thus the deposition reflects plume conditions directly above the deposition point. The actual deposition patterns, because the hydrometeors are wind blown, reflect plume conditions upwind; the effect is complicated by the fact that hydrometeors of different sizes see different plumes enroute to a given deposition point. Generally the deposition plume is narrower and more peaked than the air concentration plume. The cross-plume integrated scavenging flux is always less than that expected from vertical precipitation at great distances from the plume source. (Author abstract modified)

51673

APTIC NO. 73980

Dana, M. Terry and Donald W. Glover

PRECIPITATION SCAVENGING OF POWER PLANT EFFLUENTS: RAINWATER CONCENTRATIONS OF SULFUR AND NITROGEN COMPOUNDS AND EVALUATION OF RAIN SAMPLER DESORPTION OF SO₂. In: Pacific Northwest Laboratory Annual Report for 1974 to the USAEC Division of Biomedical and Environmental Research. Part 3: Atmospheric Sciences. Battelle

AIR POLLUTION ABSTRACTS, OCTOBER 1975

Memorial Inst., Richland, Wash., Pacific Northwest Labs., Rept. UC-11, p. 98-108, Feb. 1975. 11 refs.

NTIS: BNWL-1950 PT3

A precipitation scavenging experiment was performed at a coal-fired power plant to evaluate the extent to which sulfur dioxide desorbs from rainwater on standard rain sampler surfaces prior to chemical fixing in the collection bottles. A comparison of the results obtained from standard samplers and accompanying no-desorption samplers revealed that about 20% of the SO₂ was lost from the former. Calculations and qualitative meteorological information indicated that the 20% figure is probably near the maximum for power plant plume conditions. Unusually high sulfate concentrations were found near the stack; while nitrite, nitrate, and ammonium concentrations were near detection limits. (Author abstract modified)

51674

APTIC NO. 73983

Davis, W. E. and J. A. Young

RESULTS OF IN-CLOUD TRACER RELEASES IN FRONTAL STORMS. In: Pacific Northwest Laboratory Annual Report for 1974 to the USAEC Division of Biomedical and Environmental Research. Part 3: Atmospheric Sciences. Battelle Memorial Inst., Richland, Wash., Pacific Northwest Labs., Rept. UC-11, p. 119-134, Feb. 1975. 16 refs.

NTIS: BNWL-1950 PT3

In-cloud tracer releases were performed during six frontal storms, and measurable tracer concentrations were observed in several rainwater samples examined. The maximum tracer deposition, however, occurred 20-30 nautical miles downwind from the projected area of initial deposition as determined by vertical wind profiles and the raindrop fall velocities. Possible explanations for the unexpected point of maximum ground deposition are that the material injected was gradually attached to the cloud water which is more easily scavenged and that the rainfall rate increased causing the scavenging coefficient to increase which in turn caused the deposition to increase. A combination of these two factors is also possible. (Author abstract modified)

51675

APTIC NO. 74158

Fricke, J.

ARE WE DESTROYING OUR PROTECTIVE OZONE LAYER? (Zerstören wir unser Ozon-Schutzschild)? Text in German. Physik Z., 6(2):33, March 1975.

Possible mechanisms and hazards of the destruction of the protective stratospheric ozone layer by air pollutants are described. The ozone layer, retaining 99% of the harmful ultraviolet radiation at wavelengths below 320 nanometers is maintained in equilibrium by its interaction with molecular oxygen, hydroxy radical, and spontaneously occurring nitric oxide formed from nitrous oxide. The destruction of the ozone layer can be substantially accelerated by chlorinated and fluorinated hydrocarbons used as propellants in spray cans. Anticipating a continuing exponential growth of spray production, the destruction of ozone can be expected to amount to 7% in 1984, and to 30% in 1994. The large quantities of nitric oxide and nitrous oxide released during atomic bomb tests and by stratospheric supersonic aircraft also tend to reduce the ozone concentration.

51676

APTIC NO. 73845

Fulkerson, W., A. W. Andren, N. E. Bolton, J. A. Carter, J. F. Emery, C. Feldman, L. D. Hulett, D. H. Klein, W. S. Lyon, M. T. Mills, J. C. Ogle, Y. Talmi, and R. I. Van Hook

ALLEN STEAM PLANT STUDY. In: Energy Division Annual Progress Report. Energy Research and Development Administration, Oak Ridge, Tenn., Oak Ridge National Lab., Energy Research and Development Administration Contract W-7405-eng-26, p. 77-82, April 1975. 7 refs.

NTIS: ORNL 5030

Studies investigating the disposition of trace elements from coal combustion at the Tennessee Valley Authority's Thomas A. Allen steam plant are reported. A mass balance obtained for 38 trace elements indicates that arsenic, cadmium, copper, gallium, molybdenum, lead, antimony, selenium, and zinc are concentrated in both the inlet and outlet fly ash, with the concentrations tending to be higher in the outlet fly ash. Model calculations of the transport and deposition of trace elements in the vicinity of the plant indicate a substantial margin of safety relative to ambient air concentrations, even for the case of very severe meteorological conditions. The calculations also show that only if the concentration of an element in the fly ash is 100 or more times that in the soil will the increase in concentration of the top layer of soil (less than 1 cm) be measurable, even with an accumulation over 10 yr or more. Only selenium shows a concentration ratio approaching 100. Soil core samples taken 20 mi north and 20 mi south of the plant reveal no appreciable difference in element concentrations in the upper 1 in. versus the 6-inch soil depth.

51677 APTIC NO. 73809

Gatayama, Tetsuya, Masayoshi Okamoto, Takeo Hashimoto, and Hiromi Yoshida

CORRELATION ANALYSIS BETWEEN O₃ AND NON-METHANE HYDROCARBONS IN THE ATMOSPHERE.

(Taiki chu no O₃ to himetan kei tanka suiso tonu soka kaiseki). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 778, 1975. (Presented at the Japan Chemical Society Spring Term Annual Meeting, 32nd, Tokyo, Japan, April 1-4, 1975, Paper 1030.)

Atmospheric hydrocarbon levels were analyzed by gas chromatography in the Kawasaki area and the correlation between non-methane hydrocarbon level and ozone was studied in order to forecast the maximum daily O₃ level in the area. The non-methane hydrocarbon level is defined as the hydrocarbon level obtained by subtracting the methane level from the total hydrocarbon level. The transition of total hydrocarbon level agreed with the automobile traffic pattern. The lowest level of non-methane hydrocarbon was observed at 7 am and 1 pm daily, while the highest ozone level observed in May was at 1 pm. The monthly average of O₃ in May and December was 4.6 pphm and 1.2 pphm respectively. The 3-hour average of non-methane hydrocarbon was calculated every hr continuously, and each average value was compared for the correlation with the highest O₃ level observed on the same day. The best correlation (0.74) was observed when the averaged value for 3 am to 6 am was used.

51678 APTIC NO. 73987

Hane, Carl E.

PRECIPITATION SCAVENGING IN A SQUALL LINE: NUMERICAL EXPERIMENTATION.

In: Pacific Northwest Laboratory Annual Report for 1974 to the USAEC Division of Biomedical and Environmental Research. Part 3: Atmospheric Sciences. Battelle Memorial Inst., Richland, Wash., Pacific Northwest Labs., Rept. UC-11, p. 143-149, Feb. 1975. 1 ref.

NTIS: BNWL-1950 PT3

A squall line thunderstorm numerical model is described and applied to an actual squall line situation which occurred on August 21, 1972 over St. Louis, Missouri. The model is two-dimensional and time dependent with parameterized microphysics. An aperiodic series of developments occurs in the model calculations, with maximum updraft speeds reaching about 25/m sec. A time is chosen when a typical circulation pattern is occurring; and the motion field, cloudwater distribution, and rainwater distribution are assumed steady for the purpose of precipitation scavenging calculations. A pollutant plume is allowed to enter the storm circulation from various locations and heights surrounding the storm, and the resulting redistribution of pollutant is examined with the assumptions that the pollutant travels with the air and does not interact with the liquid water and that the pollutant enters the rain

and/or cloud to varying degrees and is carried to the ground. (Author abstract modified)

51679 APTIC NO. 74008

Horst, T. W. and C. E. Elderkin

AN ASSESSMENT OF THE LONG-TERM EXPOSURE DUE TO RESUSPENSION - PART II. In: Pacific Northwest Laboratory Annual Report for 1974 to the USAEC Division of Biomedical and Environmental Research. Part 3: Atmospheric Sciences. Battelle Memorial Inst., Richland, Wash., Pacific Northwest Labs., Rept. UC-11, p. 237-239, Feb. 1975. 2 refs.

NTIS: BNWL-1950 PT3

A previous model for the ratio between the exposure due to resuspension of particulate material and the exposure due to direct atmospheric transport from a source is extended to account for the radioactive decay of a hazardous material and for a lower limit of the resuspension factor. The modifications affect the evaluation of the hazard of environmental releases of plutonium only for a source which emits continuously for thousands of years. (Author abstract modified)

51680 APTIC NO. 74009

Horst, T. W.

THE RESUSPENSION RATIO FOR A GAUSSIAN PLUME. In: Pacific Northwest Laboratory Annual Report for 1974 to the USAEC Division of Biomedical and Environmental Research. Part 3: Atmospheric Sciences. Battelle Memorial Inst., Richland, Wash., Pacific Northwest Labs., Rept. UC-11, p. 240-242, Feb. 1975. 5 refs.

NTIS: BNWL-1950 PT3

A surface flux model is used to calculate the resuspension ratio (the air concentration due to resuspension divided by that due to direct atmospheric transport from the source) for the Gaussian diffusion plume from a single source. The total air concentration of the particulate material is the same as that calculated by simply ignoring both deposition and resuspension, assuming a steady state situation during constant atmospheric conditions exists and that all deposited material is available for resuspension. (Author abstract modified)

51681 APTIC NO. 74010

Horst, T. W.

RESUSPENSION FROM A UNIFORM AREA SOURCE.

In: Pacific Northwest Laboratory Annual Report for 1974 to the USAEC Division of Biomedical and Environmental Research. Part 3: Atmospheric Sciences. Battelle Memorial Inst., Richland, Wash., Pacific Northwest Labs., Rept. UC-11, p. 243-246, Feb. 1975. 2 refs.

NTIS: BNWL-1950 PT3

The air concentrations of material resuspended from an upwind area source (horizontally uniform) are calculated as a function of atmospheric stability, deposition velocity, and distance from the upwind edge of the source. A limiting condition is observed beyond which resuspension is exactly balanced by deposition; i.e., there is no net transfer of material into the air from the ground. The horizontal flux of material in the downwind direction also reaches a constant value when the resuspension is balanced by deposition. (Author abstract modified)

51682 APTIC NO. 73984

Lee, R. N.

A REEVALUATION OF THE USE OF RHODAMINE FOR IN-CLOUD SCAVENGING STUDIES. In: Pacific Northwest Laboratory Annual Report for 1974 to the USAEC Division of Biomedical and Environmental Research. Part 3: Atmospheric Sciences. Battelle Memorial

Inst., Richland, Wash., Pacific Northwest Labs., Rept. UC-11, p. 134-136, Feb. 1975. 3 refs.

NTIS: BNWL-1950 PT3

The use of the tracer rhodamine B for in-cloud scavenging studies was evaluated. An initial examination of rain samples collected during the test indicated the presence of the fluorescent dye but failed to identify the tracer unequivocally. Reexamination of the rain samples with a spectrophotofluorometer indicated that effects related to the presence of particulate matter dominate the analysis at the sub-ppb level. The future use of rhodamine B for in-cloud scavenging studies is not recommended. (Author abstract modified)

51683

APTIC NO. 74095

Misawa, T.

AIR POLLUTION IN SENDAI CITY. (*Sendai-shi ni okeru taiki oson*). Text in Japanese. Tohoku Chiri (Ann. Tohoku Geogr. Assoc.), 27(1):36-44, Jan. 1975. 2 refs.

Investigations on air pollution and local climatological conditions in Sendai were carried out at 9 automatic monitoring stations from December 1971 on. Total sulfur oxides emission in 1971 was estimated at 10,550 tons and about 90% were from the industrial area at new harbor area. The average SOx concentrations at the City Office, Health Department, and Nakayama residential area on weekdays in Jan. 1973 were 14.3 ppm, 16.0 ppm and 12.8 ppm, respectively, while those on weekends were 7.8 ppm, 11.3 ppm and 12.3 ppm, respectively. The average concentrations showed little difference between weekdays and weekends in August. The concentration of SOx in air showed different seasonal and weekly patterns in the business, industrial, and residential districts, marked concentrations of SOx expanded to the leeward of the built-up area in winter, but not in summer. The concentration of air pollution in and around the built-up area was mostly affected by wind direction rather than wind velocity. When SE wind prevailed over the city, anomalies of concentration appeared not only in the leeward area of pollution sources but also in the windward side including Shichigo and Nakano. Clear vertical differences of concentration were frequently observed at the urban center at night.

51684

APTIC NO. 73971

Nickola, P. W., G. H. Clark, and J. D. Ludwick

FREQUENCY DISTRIBUTION OF ATMOSPHERIC TRACER CONCENTRATION DURING PERIODS OF LOW WINDS. In: *Pacific Northwest Laboratory Annual Report for 1974 to the USAEC Division of Biomedical and Environmental Research. Part 3: Atmospheric Sciences. Battelle Memorial Inst., Richland, Wash., Pacific Northwest Labs., Rept. UC-11, p. 51-55, Feb. 1975. 5 refs.*

NTIS: BNWL-1950 PT3

Tracer releases into stable and unstable atmospheres were examined with respect to the frequency distribution of short-period (10 sec) concentrations to assess the extent to which atmospheric turbulence causes short-period deviations from the mean concentration. Unstable conditions resulted in a greater number of concentration excursions above the mean plume centerline concentration than did stable atmospheric conditions, although a greater proportion of concentrations above four times the mean value were recorded during stable conditions. Observed exposures were considerably lower than those predicted by a Gaussian plume model with Pasquill dispersion parameters. (Author abstract modified)

51685

APTIC NO. 73995

Nickola, P. W. and R. N. Lee

DIRECT MEASUREMENTS OF PARTICULATE DEPOSITION ON A SNOW SURFACE. In: *Pacific Northwest Laboratory Annual Report for 1974 to the USAEC Division of Biomedical and Environmental Research. Part 3: Atmospheric Sciences. Battelle Memorial Inst., Richland,*

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Wash., Pacific Northwest Labs., Rept. UC-11, p. 185-188, Feb. 1975. 4 refs.

NTIS: BNWL-1950 PT3

Zinc sulfide and rhodamine particulate tracers were released simultaneously for one-half hour during a period when the ground surface was covered with snow, and deposition velocities were calculated. The median deposition velocities measured at an elevation of 1.5 m ranged from 0.09 cm/sec at 1.6 km from the source to 2.4 cm/sec at 0.2 km from the source for zinc sulfide and from 0.14 cm/sec at 1.6 km from the source to 3.7 cm/sec at 0.2 km from the source for rhodamine. These deposition velocities were more than an order of magnitude lower than deposition velocities previously measured over the same field grid. However, the previously determined velocities were obtained over a dry surface (including vegetation), while the velocities from the current experiment appear applicable only to a smooth snow surface. (Author abstract modified)

51686

APTIC NO. 73996

Nickola, P. W. and G. H. Clark

PROSPECTS FOR TRACER MASS BALANCE COMPUTATIONS ON A DENSE THREE DIMENSIONAL SAMPLING GRID. In: *Pacific Northwest Laboratory Annual Report for 1974 to the USAEC Division of Biomedical and Environmental Research. Part 3: Atmospheric Sciences. Battelle Memorial Inst., Richland, Wash., Pacific Northwest Labs., Rept. UC-11, p. 189-192, Feb. 1975. 3 refs.*

NTIS: BNWL-1950 PT3

The reliability of tracer mass balance computations on a dense three-dimensional sampling grid are discussed in relation to a field study designed to measure deposition of a particulate tracer by comparison with a non-depositing inert gas tracer. Mass balances well below 100% were obtained despite the use of a densely instrumented sampling grid that included towers placed at 8-degree increments. A wide variation in computed crosswind integrated exposures was obtained which depended merely on which sampler happened to be selected as the starting point in the 8-degree increment. Thus, obtaining a precise mass balance through several vertical planes is to a great extent fortuitous, and caution must be observed in the specification of other mean plume characteristics developed on the basis of sparse sampling in space and/or time. (Author abstract modified)

51687

APTIC NO. 74006

Orgill, M. M. and G. A. Sehmel

FREQUENCY AND DIURNAL VARIATION OF DUST IN THE CONTINENTAL UNITED STATES. In: *Pacific Northwest Laboratory Annual Report for 1974 to the USAEC Division of Biomedical and Environmental Research. Part 3: Atmospheric Sciences. Battelle Memorial Inst., Richland, Wash., Pacific Northwest Labs., Rept. UC-11, p. 226-231, Feb. 1975. 5 refs.*

NTIS: BNWL-1950 PT3

Frequency of dust periods, as indicated by a visibility less than 11 km, are presented based on an analysis of existing weather data for 343 stations throughout the continental United States. Many regions of the country, such as urban, agricultural, desert, valley, plain, and forested areas, are subject to resuspended dust in varying degrees. Seasonal dust frequency is bimodal in certain regions of the country, with a primary maximum between March and May and a secondary maximum in the fall or early winter months. Hourly variations of dust appear in four types of diurnal curves: afternoon maximum, random, mixed, and late afternoon and evening maximum. The afternoon maximum is the more common diurnal variation and occurs in many locations. Contour lines drawn to approximate the annual dust frequencies at each station range from 0-3% dust/yr.

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51693

51688

APTIC NO. 74007

Orgill, M. M., M. R. Petersen, and G. A. Schmel

SOME INITIAL MEASUREMENTS OF DDT RESUSPENSION AND TRANSLOCATION FROM PACIFIC NORTHWEST FORESTS. In: *Pacific Northwest Laboratory Annual Report for 1974 to the USAEC Division of Biomedical and Environmental Research. Part 3: Atmospheric Sciences. Battelle Memorial Inst., Richland, Wash., Pacific Northwest Labs., Rept. UC-11, p. 231-236, Feb. 1975. 4 refs.*

NTIS: BNWL-1950 PT3

Airborne dichlorodiphenyltrichloroethane (DDT) was sampled by an aircraft-mounted high-volume sampler for 5 days during and after the spraying of a forest to obtain information of the resuspension and volatilization of the insecticide. The total airborne DDT level as well as that of one of its degradation products was significantly high during 4 of the sampling days, except for background and high altitude samples. Values of total airborne DDT ranged from 0.088 ng/cu m to a maximum of 18.764 ng/cu m at an altitude of 2700 ft. Calculated resuspension rates for particulated DDT on three of the sampling days were 1.0 times 10 to the -8, 2.5 times 10 to the -8, and 7.7 times 10 to the -8 fraction resuspended per second. (Author abstract modified)

51689

APTIC NO. 73973

Powell, D. C. and T. W. Horst

COMPARATIVE ANALYSIS OF ATMOSPHERIC BOUNDARY LAYER TURBULENCE THROUGH A 60-M LAYER. In: *Pacific Northwest Laboratory Annual Report for 1974 to the USAEC Division of Biomedical and Environmental Research. Part 3: Atmospheric Sciences. Battelle, Richland, Wash., Pacific Northwest Labs., Rept. UC-11, p. 58-64, Feb. 1975. 5 refs.*

NTIS: BNWL-1950 PT3

A power spectral analysis of wind component data obtained by sonic anemometers situated at heights of 7.5, 15, and 60 m is presented. The extension of the constant flux layer concept to 60 m appears to be justified for quasi-neutral, but not stable, conditions. Considerable latitude must be allowed when applying published power spectral models to power spectral analyses of similar data from another homogeneous site since significant departures can occur between different sites. (Author abstract modified)

51690

APTIC NO. 73708

Ragland, Kenneth W., Robin L. Dennis, and Kenneth E. Wilkening

BOUNDARY-LAYER MODEL FOR TRANSPORT OF URBAN AIR POLLUTANTS. Preprint, American Inst. of Chemical Engineers, New York, 28p., 1975. 11 refs. (Presented at the American Institute of Chemical Engineers, National Meeting, Session on Environmental Transport Processes, March 18, 1975, Paper 47e.)

A model for computing ambient air concentrations of chemically non-reactive air pollutants due to emissions from uniform and non-uniform area sources is described. The uniform area source is used to demonstrate some general features of the solution, while the non-uniform case represents a particular urbanized region. The model is based on the numerical solution of the species continuity equation in Eulerian form for a turbulent atmospheric boundary layer, and concentrations are obtained throughout the region as a function of time. The source inputs, meteorological conditions, and ambient air concentrations may be varied with time. The model can simulate the ambient air quality for such pollutants as carbon monoxide, particulate matter, and sulfur dioxide on an annual or a short-term basis. Nitrogen oxide and hydrocarbon concentrations may also be simulated in early morning hours before significant atmospheric chemical reactions occur. The model is applicable to those regions that do not possess a complex terrain. The model is illustrated by applying it first to the diffusion of

a uniform, ground-level area source in the atmospheric boundary layer and then to the analysis of the air quality of Madison, Wisconsin.

51691

APTIC NO. 73968

Sandusky, W. F. and D. L. Elliott

REGIONAL TRANSPORT AND DIFFUSION STUDIES OVER THE COLUMBIA BASIN. In: *Pacific Northwest Laboratory Annual Report for 1974 to the USAEC Division of Biomedical and Environmental Research. Part 3: Atmospheric Sciences. Battelle Memorial Inst., Richland, Wash., Pacific Northwest Labs., Rept. UC-11, p. 38-41, Feb. 1975. 3 refs.*

NTIS: BNWL-1950 PT3

A case study of wind fields and transport and diffusion over the Columbia Basin was made, using techniques employed in mesoscale research. Trajectory plots of serially released hypothetical particles were produced in conjunction with wind field analysis. Trajectories based on single station wind data were also constructed. A comparison of the wind field and single station trajectory plots revealed pronounced differences in the regional transport pattern resulting from the two methods. Both spatial and temporal variability in the computed wind fields and hypothetical particle trajectories were observed. Much of the variability in the flow was attributed to the topographical influence on the regional flow pattern. (Author abstract modified)

51692

APTIC NO. 73992

Schmel, G. A. and W. H. Hodgson

PARTICLE DRY DEPOSITION VELOCITIES. In: *Pacific Northwest Laboratory Annual Report for 1974 to the USAEC Division of Biomedical and Environmental Research. Part 3: Atmospheric Sciences. Battelle Memorial Inst., Richland, Wash., Pacific Northwest Labs., Rept. UC-11, p. 175-180, Feb. 1975. 4 refs.*

NTIS: BNWL-1950 PT3

Particle deposition velocities are predicted from a steady-state one-dimensional mass transfer model using dimensionless integral mass transfer resistances. The deposition velocities are calculated as a function of particle diameter (0.01-100 micron), friction velocity (10-200 cm/sec), roughness height (0.001-10 cm), particle density (1-11.5 g/cu cm), and atmospheric stabilities for Obukhov's lengths from -10 + 10 m at a reference concentration height of 1 m. The deposition velocities vary by several orders of magnitude from about 0.001-10 cm/sec and increase with an increase in roughness height and friction velocity. Deposition velocity also increases with particle density, except for small particles where Brownian diffusion controls mass transfer.

51693

APTIC NO. 73993

Schmel, G. A. and W. H. Hodgson

PENETRATION OF DEPOSITION PARTICLES THROUGH CRUSHED GRAVEL. In: *Pacific Northwest Laboratory Annual Report for 1974 to the USAEC Division of Biomedical and Environmental Research. Part 3: Atmospheric Sciences. Battelle Memorial Inst., Richland, Wash., Pacific Northwest Labs., Rept. UC-11, p. 181-183, Feb. 1975. 4 refs.*

NTIS: BNWL-1950 PT3

The penetration of 0.028-1 micron diameter particles depositing through a single layer of 3.8-5.1 cm diameter crushed gravel was measured in a wind tunnel at air velocities of 3-17 m/sec. Penetration increased with increasing particle diameter and decreased with increasing air velocity. The fraction of particles which penetrated to the underlying surface ranged from 2-25%. The average coverage of the gravel by deposited particles ranged from 0.03-1.0% and that for the underlying surface from 0.02-0.2%. Similar penetrations can be expected in vegetative canopies. (Author abstract modified)

51694

51694

APTIC NO. 73999

Sehmel, G. A. and F. D. Lloyd

INITIAL PARTICLE RESUSPENSION RATES - A FIELD EXPERIMENT USING TRACER PARTICLES. In: *Pacific Northwest Laboratory Annual Report for 1974 to the USAEC Division of Biomedical and Environmental Research. Part 3: Atmospheric Sciences. Battelle Memorial Inst., Richland, Wash., Pacific Northwest Labs., Rept. UC-11, p. 203-207, Feb. 1975. 4 refs.*

NTIS: BNWL-1950 PT3

Resuspension rates of submicron calcium molybdate tracer particles were measured up to a height of 6.1 m. The area onto which the particles were seeded was a lightly vegetated area about 23 m in radius. Resuspension rates for respirable particles increased from 2.0 times 10 to the -10 fraction resuspended/sec for a 1.3-3.6 m/sec wind speed interval to 2.2 times 10 to the -8 fraction resuspended/sec for the 5.8-20.1 m/sec speed interval, an increase of two orders of magnitude. A resuspension rate of 1.3 times 10 to the -11 fraction resuspended/sec for nonrespirable particles was determined for the entire sampling period. Although there appeared to be some apparent relationship between resuspension rates and resuspension factors, the data were insufficient to draw conclusions. Resuspension factors between 10 to the -10 and 10 to the -9/m were comparable to resuspension rates between 10 to the -10 and 10 to the -8 fraction resuspended/sec.

51695

APTIC NO. 74001

Sehmel, G. A.

INITIAL CORRELATION OF PARTICLE RESUSPENSION RATES AS A FUNCTION OF SURFACE ROUGHNESS HEIGHT. In: *Pacific Northwest Laboratory Annual Report for 1974 to the USAEC Division of Biomedical and Environmental Research. Part 3: Atmospheric Sciences. Battelle Memorial Inst., Richland, Wash., Pacific Northwest Labs., Rept. UC-11, p. 209-212, Feb. 1975. 4 refs.*

NTIS: BNWL-1950 PT3

Particle resuspension rates from a smooth surface were experimentally measured for monodispersed particles as a function of time. Resuspension rate decreased nonexponentially with time at a constant friction velocity, suggesting that the concept of a resuspension weathering exponential half-life may be questioned under same conditions. Attempts to grossly correlate resuspension rate with aerodynamic roughness heights ranging from a smooth surface to that for a forest resulted in qualitative agreement with the concept that resuspension rates decrease with increasing surface roughness. (Author abstract modified)

51696

APTIC NO. 74002

Sehmel, G. A.

AIRBORNE DUST SIZE DISTRIBUTIONS AS A FUNCTION OF WIND SPEED. In: *Pacific Northwest Laboratory Annual Report for 1974 to the USAEC Division of Biomedical and Environmental Research. Part 3: Atmospheric Sciences. Battelle Memorial Inst., Richland, Wash., Pacific Northwest Labs., Rept. UC-11, p. 213-215, Feb. 1975. 2 refs.*

NTIS: BNWL-1950 PT3

Airborne concentrations of respirable particles were determined as a function of wind speed increments at elevations of 0.3-29.9 m. The airborne concentrations of the particles increased as wind speed increased, and for wind speeds above about 4 m/sec, increases of around the third power were observed. The concentration of 1.1 micron particles ranged from 5-50/cu cm/micron; the concentrations of 1.9 micron and 3.6 micron particles ranged from 0.5-8/cu cm/micron and 0.02-0.5/cu cm/micron, respectively. Particle concentrations in each case increased an order of magnitude with increases in wind speed from 1.3 to 9 m/sec. Total mass loadings of respirable

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particles ranged from 13-360 micrograms/cu m, indicating that resuspended dust loadings during high winds can exceed annual and 24-hour Ambient Air Quality Standards. (Author conclusions modified)

51697

APTIC NO. 74003

Sehmel, G. A. and F. D. Lloyd

RESUSPENSION OF PLUTONIUM AT ROCKY FLATS. In: *Pacific Northwest Laboratory Annual Report for 1974 to the USAEC Division of Biomedical and Environmental Research. Part 3: Atmospheric Sciences. Battelle Memorial Inst., Richland, Wash., Pacific Northwest Labs., Rept. UC-11, p. 216-221, Feb. 1975. 6 refs.*

NTIS: BNWL-1950 PT3

Airborne concentrations of plutonium were measured as a function of particle size, wind speed, and height (0.3-30 m) in an area where liquid from storage drums containing contaminated cutting oils and solvents was lost to the ground to determine the amount of resuspension of the material. The maximum airborne concentration measured was 3.7 times 10 to the -15 Curie/cu m, and the maximum concentration per gram of gross airborne soil was 50 picoCurie/g. Although concentrations decreased with height below 10 m, the opposite occurred between elevations of 10-30 m, suggesting an elevated upwind source. (Author abstract modified)

51698

APTIC NO. 74005

Sehmel, G. A. and M. M. Orgill

RESUSPENSION OF RADIOACTIVITY INDUCED BY BURNING CROP STUBBLE. In: *Pacific Northwest Laboratory Annual Report for 1974 to the USAEC Division of Biomedical and Environmental Research. Part 3: Atmospheric Sciences. Battelle Memorial Inst., Richland, Wash., Pacific Northwest Labs., Rept. UC-11, p. 223-225, Feb. 1975. 4 refs.*

NTIS: BNWL-1950 PT3

Airborne particulates resulting from the burning of crop stubble were sampled with an aircraft-mounted air filter to determine if accumulated chronic low-level radioactive surface contamination is resuspended during burning operations. Airborne concentrations of beryllium-7 and niobium-zirconium-95 in the smoke were 1.2 to 4.6 times ambient background levels. The increased radioactivity in the smoke suggested that surface contamination can be released by fire. (Author abstract modified)

51699

APTIC NO. 73978

Slinn, W. G. N.

BELOW CLOUD SCAVENGING OF PARTICLES. In: *Pacific Northwest Laboratory Annual Report for 1974 to the USAEC Division of Biomedical and Environmental Research. Part 3: Atmospheric Sciences. Battelle Memorial Inst., Richland, Wash., Pacific Northwest Labs., Rept. UC-11, p. 87-90, Feb. 1975. 11 refs.*

NTIS: BNWL-1950 PT3

Predictive formulae for below-cloud rain and snow scavenging of particles are presented and compared with available data. Diffusion and impaction expressions are reliable to within about 20% for rainout data, although major uncertainties remain for particles between 0.1 and 1 micron. An expression for snow scavenging rate that involves the acceleration of gravity, the density of water and air, the snowfall rate in rain-water equivalent, the terminal velocity of the snowflake type, and the collection efficiency fairly adequately reflects available data on snowout, although more experimental data are required for verification.

51700

APTIC NO. 73982

Slinn, W. G. N.

IN-CLOUD SCAVENGING OF AEROSOL PARTICLES. In: *Pacific Northwest Laboratory Annual Report for 1974*

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to the USAEC Division of Biomedical and Environmental Research. Part 3: Atmospheric Sciences. Battelle Memorial Inst., Richland, Wash., Pacific Northwest Labs., Rept. UC-11, p. 114-118, Feb. 1975. 14 refs.

NTIS: BNWL-1950 PT3

A model for in-cloud scavenging of aerosol particles is presented which focuses on the removal of the pollutant from the cloud. An expression for the observed removal rate is derived that involves dividing the total contaminant concentration into the quantity expressed by the sum of the concentration of contaminant unattached to cloud particles multiplied by the rate at which the particles are directly removed from the cloud by hydrometeors plus the concentration of contaminant attached to condensed cloud water multiplied by the removal rate for the case when the cloud particles motion differs from the air s.

51701

APTIC NO. 73991

Slinn, W. G. N.

PROPOSED TERMINOLOGY FOR PRECIPITATION SCAVENGING. In: *Pacific Northwest Laboratory Annual Report for 1974 to the USAEC Division of Biomedical and Environmental Research. Part 3: Atmospheric Sciences. Battelle Memorial Inst., Richland, Wash., Pacific Northwest Labs., Rept. UC-11, p. 170-173, Feb. 1975.*

NTIS: BNWL-1950 PT3

A list of suggested definitions for concepts in precipitation scavenging is presented. Concepts covered include: below-cloud scavenging, in-cloud scavenging, plume washout, rain scavenging, snow scavenging, precipitation scavenging rates, below-cloud scavenging rates, in-cloud scavenging rates, and precipitation scavenging concentration ratios. The major feature of the proposed terminology is to abandon past usage of the words washout and rainout. A list of symbols and units used in precipitation scavenging literature is also provided. (Author abstract modified)

51702

APTIC NO. 73997

Slinn, W. G. N.

SOME NEW MODELS FOR DRY DEPOSITION OF AEROSOL PARTICLES FROM THE ATMOSPHERE.

In: *Pacific Northwest Laboratory Annual Report for 1974 to the USAEC Division of Biomedical and Environmental Research. Part 3: Atmospheric Sciences. Battelle Memorial Inst., Richland, Wash., Pacific Northwest Labs., Rept. UC-11, p. 193-197, Feb. 1975. 6 refs.*

NTIS: BNWL-1950 PT3

Models describing the dry deposition of aerosol particles in the deposition and canopy layers are reviewed. A new multilayer scheme is presented, and deposition to a smooth surface is modeled assuming that particles are convected across the viscous sublayer by the leading edge of turbulent eddies. A simple flux balance gives an estimate of dry deposition in a canopy. Adequate fit to experimental data can be achieved by varying the parameters of the models. (Author abstract modified)

51703

APTIC NO. 73998

Slinn, W. G. N.

SOME ASPECTS OF THE RESUSPENSION PROBLEM.

In: *Pacific Northwest Laboratory Annual Report for 1974 to the USAEC Division of Biomedical and Environmental Research. Part 3: Atmospheric Sciences. Battelle Memorial Inst., Richland, Wash., Pacific Northwest Labs., Rept. UC-11, p. 199-202, Feb. 1975. 10 refs.*

NTIS: BNWL-1950 PT3

Aspects of particle resuspension dealing with the horizontal flux of particles during a dust storm, the relationship between soil erodibility and resuspension factor, and an aerosol kinetic equation for soil particle size distribution are reviewed. The solution to the aerosol kinetic equation for negligible coagula-

tion and steady state conditions is the Jung distribution for a specific breaking process. A new estimate for the total horizontal flux of dust is presented that is based on the assumption that near the surface during a dust storm the vertical flux of horizontal momentum is carried essentially by the particles. An expression for soil erodibility is related to the suspension flux in general and to the resuspension factor in particular with the aid of a Gaussian plume model.

51704

APTIC NO. 73765

Stukel, J. J., R. L. Solomon, and J. L. Hudson

A MODEL FOR THE DISPERSION OF PARTICULATE OR GASEOUS POLLUTANTS FROM A NETWORK OF STREETS AND HIGHWAYS. Preprint, Illinois Univ. at Urbana-Champaign, Urbana, Dept. of Chemical Engineering, 35p., 1975 (?). 30 refs.

A computerized model for predicting the atmospheric transport of particulate (any size distribution) and gaseous air pollutants from a network of streets and highways is described. The sources are finite length line segments representing the network of city streets and rural highways. The model predicts the dispersion of pollutants in any region of flat terrain. The inputs required for the model are the coordinates of the highway segments, traffic counts, and meteorological conditions. The model is successfully used to estimate the distribution of lead emitted from automobiles in the vicinity of Urbana-Champaign, a region that includes both rural and urban sources. (Author abstract modified)

51705

APTIC NO. 73944

Tanner, T. M.

RARE ELEMENTS AS TRACERS OF THE DYNAMIC PROCESSES IN STORM SYSTEMS.

In: *Pacific Northwest Laboratory Annual Report for 1974 to the USAEC Division of Biomedical and Environmental Research. Part 4: Physical and Analytical Sciences. Battelle Memorial Inst., Richland, Wash., Pacific Northwest Labs., UC-48, p. 18-19, Feb. 1975.*

NTIS: BNWL-1950 PT4

A technique for addition of trace amounts of rare elements to storm systems and their subsequent analysis in precipitation is described. Rare element tracers in the form of submicron aerosols are generated from aircraft-mounted burners and provide a means for obtaining information on air entrainment in convective storm systems. The collected ground level precipitation sample is analyzed by neutron activation. Tracer elements low in natural abundance and thus appropriate for use include: tantalum, europium, indium, ruthenium, gold, iridium, and rhenium.

51706

APTIC NO. 74168

Wakamatsu, Shinji

SEA BREEZE AND AIR POLLUTION IN KANAGAWA PREFECTURE. PART 1. (Kanagawa-ken no kaifu to taiki osen, 1). Text in Japanese. Tenki (Weather), 22(2):79-83, Feb. 1975.

The effect of wind velocity and direction on sulfur dioxide pollution in Kanagawa Prefecture during the winter from 1970 through 1973 was studied. The weather map over Japan was classified into six types in which typical winter distributions (high pressure in the west and low pressure in the east) gave a low probability of high SO₂ levels. On 112 days out of 364 days during the investigation, the SO₂ level was about 0.20 ppm, and invasions of mild sea were observed on most of these 112 days. A localized line of discontinuity between the sea wind and the seasonal wind was formed in the area.

51707

APTIC NO. 73773

Watanabe, T., K. Nahase, and J. Fukutomi

DIFFUSION EXPERIMENTS IN A WIND TUNNEL -- THE WIND FLOW ABOUT A MOUNTAIN THE AT-

ATMOSPHERIC TURBULENT BOUNDARY LAYER. (Taiki kakusan moderu jikken ni kansuru kenkyu -- taiki kyokaiso chu no yama kinbo no nagare). Text in Japanese. Tokushima Daigaku Kogakubu Kenkyu Hokoku (Sci. Pap. Fac. Eng. Tokushima Univ.), no. 20:41-47, 1975. 8 refs.

A wind tunnel experiment with satisfactory kinematic similarity and turbulent similarity was carried out to study wind flow over mountains and downdraft phenomena. The wind tunnel used for the study was a 700 mm by 700 mm by 3000 mm polyvinyl chloride tube at 1/4000 scale. Circular bars (16 mm diameter) and tripping sheets were equipped on a suction nozzle surface to give a boundary layer thickness of 200-250 m. A 25 mesh Rectification screen and a turbulent screen were equipped at the nozzle entrance and the inlet of the test section, respectively. A two-dimensional 50 mm by 200 mm mountain was placed at 1600 mm from the inlet of the test section. Isolated turbulence occurred behind the mountain and extended to a distance approximately 7 times the height of the mountain. The distribution coefficient behind the mountain was about 10 times that in front of the mountain, indicating an increasing turbulent energy.

51708

APTIC NO. 73967

Wendell, L. L. and D. C. Powell

REGIONAL TRANSPORT, DISPERSION AND REMOVAL OF ATMOSPHERIC POLLUTANTS. In: *Pacific Northwest Laboratory Annual Report for 1974 to the USAEC Division of Biomedical and Environmental Research. Part 3: Atmospheric Sciences. Battelle Memorial Inst., Richland, Wash., Pacific Northwest Labs., Rept. UC-11, p. 29-33, Feb. 1975. 7 refs.*

NTIS: BNWL-1950 PT3

The ongoing development of a regional scale transport and dispersion model for assessing the environmental impact of current and future levels of pollution from industrial emission sources is described. Preliminary work involves examining the effects of time and space scales for a 1400 by 1400 km area on transport and diffusion considerations used in micro and meso scale work (less than 100 km). The vertical extent of pollutants released into the atmosphere from a surface based structure is described as a function of the growth caused by turbulent diffusion and the inhibition caused by the presence of a more stable layer aloft. Dry deposition is to be incorporated simply as source depletion as a function of distance, and wet deposition is to be incorporated by approximating the time history of cloudiness and precipitation over the region of interest. Radiological and chemical transformation processes occurring in the contaminants as they move from the source will be done by parameterization during the initial stages of the work.

51709

APTIC NO. 73975

Young, J. A., T. M. Tanner, C. W. Thomas, N. A. Wogman, and M. R. Petersen

CONCENTRATIONS AND RATES OF REMOVAL OF CONTAMINANTS FROM THE ATMOSPHERE IN AND DOWNWIND OF ST. LOUIS. In: *Pacific Northwest Laboratory Annual Report for 1974 to the USAEC Division of Biomedical and Environmental Research. Part 3: Atmospheric Sciences. Battelle Memorial Inst., Richland, Wash., Pacific Northwest Labs., Rept. UC-11, p. 70-76, Feb. 1975.*

NTIS: BNWL-1950 PT3

Various trace elements, sulfates, sulfur dioxide, and Freon were measured upwind, in, and downwind of St. Louis to determine the decrease in atmospheric concentrations downwind of the city that result from atmospheric mixing, dry deposition, and (in the case of SO₂) chemical reactions. The concentrations of anthropogenic trace elements such as lead and bromine, produced in large amounts by city traffic, generally decreased rapidly between the city center and 20 mi downwind because of vertical mixing but then decreased slowly with distance. The decrease in Freon-11 between

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downwind St. Louis and 20 mi downwind was considerably less than that for lead and bromine because Freon-11 is released primarily in the suburbs. Sulfur dioxide concentrations decreased much more rapidly downwind of the city than did those for lead and bromine due to the conversion of SO₂ sulfates and deposition on vegetation and the earth's surface. The half-residence time of SO₂ in the atmosphere was calculated to be 4.5 h. Selenium, which is generally emitted from the same sources that emit SO₂, decreased only very slightly 20 mi downwind from the center of the city, illustrating that SO₂ is removed much more rapidly than particulates. Sulfate concentrations increased downwind of the city due to the conversion of SO₂ to sulfates; however, the increasing sulfate concentrations accounted for only about 10% of the decrease in SO₂ concentrations. (Author abstract modified)

51710

APTIC NO. 73985

Young, J. A., L. Wendell, and N. A. Wogman

CIRRUS SCAVENGING AS A MECHANISM FOR THE PRODUCTION OF RADIONUCLIDE CONCENTRATION MINIMUMS BETWEEN 6 AND 9 KM. In: *Pacific Northwest Laboratory Annual Report for 1974 to the USAEC Division of Biomedical and Environmental Research. Part 3: Atmospheric Sciences. Battelle Memorial Inst., Richland, Wash., Pacific Northwest Labs., Rept. UC-11, p. 136-140, Feb. 1975.*

NTIS: BNWL-1950 PT3

Radionuclide concentrations above, below, and at the center of cirrus clouds were measured to determine if previously observed radionuclide concentration minimums between 6 and 9 km were the result of cirrus scavenging. Radionuclide concentrations were an order of magnitude lower than expected at 1.5 km above the cirrus and were an order of magnitude higher than expected at the center of the cirrus. The cirrus appeared to be responsible for the scavenging of around 90% of the radionuclides from a layer at least 1.3 km thick.

51711

APTIC NO. 73986

Young, J. A., T. M. Tanner, C. W. Thomas, and N. A. Wogman

THE ENTRAINMENT OF TRACERS NEAR THE SIDES OF CONVECTIVE CLOUDS. In: *Pacific Northwest Laboratory Annual Report for 1974 to the USAEC Division of Biomedical and Environmental Research. Part 3: Atmospheric Sciences. Battelle Memorial Inst., Richland, Wash., Pacific Northwest Labs., Rept. UC-11, p. 140-142, Feb. 1975.*

NTIS: BNWL-1950 PT3

Iridium, rhenium, gold, europium, and tantalum tracers were released sequentially at 15,000 to 16,000 ft near the sides of convective clouds over the St. Louis area and followed to determine if the air at these locations was entrained and reached regions of precipitation scavenging. Samples of rain were collected for analysis using a 14 by 50 mi network of 187 rain collectors located east of St. Louis. Some of the precipitation samples showed tracer concentrations that were significantly above background. (Author abstract modified)

51712

APTIC NO. 73994

Young, J. A.

DETERMINATION OF AEROSOL DEPOSITION RATES ON A LAKE SURFACE USING RADON DAUGHTERS. In: *Pacific Northwest Laboratory Annual Report for 1974 to the USAEC Division of Biomedical and Environmental Research. Part 3: Atmospheric Sciences. Battelle Memorial Inst., Richland, Wash., Pacific Northwest Labs., Rept. UC-11, p. 184, Feb. 1975.*

NTIS: BNWL-1950 PT3

The concentrations of the radon daughters lead-214 and bismuth-214 were measured in the atmosphere and in lake water in conjunction with wind speed measurements to deter-

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mine the rate of turbulent deposition of atmospheric aerosols on the surface of a lake as a function of wind speed. The radon daughters which deposited on the lake surface decayed almost completely before penetrating below 20 ft. The data is currently being analyzed, and deposition velocities will be calculated from the measured inventories and atmospheric concentrations and then plotted as a function of wind speed.

51713

APTIC NO. 75373

Research Triangle Inst., Research Triangle Park, N. C.

INVESTIGATION OF RURAL OXIDANT LEVELS ARE RELATED TO URBAN HYDROCARBON CONTROL STRATEGIES (FINAL REPORT). Office of Air and Waste Management Contract 68-02-1386, Task 4, Program Element 2AC129, Rept. EPA-450/3-75-036, 35pp., March 1975. 16 refs.

NTIS: PB 242299/AS

A study was conducted in the Ohio Valley area to investigate high rural oxidant concentrations and their possible relationship to urban hydrocarbons. Gases sampled were ozone, nitrogen oxides, total hydrocarbons, methane, and selected hydrocarbons. The National Ambient Air Quality Standard for photochemical oxidants (160 micrograms/cu m hourly average) was exceeded twice as frequently at rural than at urban stations. Area wide systems of high ozone concentrations were observed where the urban influence on both hydrocarbon and ozone concentrations extended from 40-80 km downwind of Columbus, Ohio. High ozone concentrations (greater than 160 micrograms/cu m) were observed at all stations when the central region of a synoptic high pressure system moved into the region and persisted as long as the high pressure center remained in the immediate vicinity. The observations provide substantial support for the transport of ozone precursors from urban areas to rural stations under appropriate meteorological conditions. The control of hydrocarbons in any individual city does not appear to necessarily prevent the occurrence of high rural ozone concentrations since the release of hydrocarbons and NOx from anthropogenic or biogenic sources, located in either urban or rural areas, all combine to generate appreciable quantities of ozone over wide areas.

1974

51714

APTIC NO. 74018

Ackerman, Marcel

NO, NO₂ AND HNO₃ BELOW 35 KM IN THE ATMOSPHERE (TECHNICAL REPORT). Institut D'Aeronomie Spatiale De Belgique, Bruxelles (Belgium), Office of Naval Research and Department of Transportation Contract N00014-73-C0076, Proj. NR 211-166, Rept. A.A.A. 142, 26p., Nov. 1974. 47 refs.

NTIS, DDC: ADA002448

Experimental data on nitric oxide, nitrogen dioxide, and nitric acid in the troposphere and stratosphere (below 35 km) are reviewed in relation to possible effects exerted on the ozone layer by supersonic aircraft. Projected increases in nitrogen oxides from such aircraft are capable of reducing the ozone shield by about a factor of two. Higher number densities for NO are observed in the stratosphere than in the mesosphere, suggesting different production regimes. A steep decrease is observed below 3.0 km and possibly an increase in the vicinity of the tropopause below which no observation is available. Tropospheric NO₂ concentrations are extremely variable, having a spread of almost two orders of magnitude. The levels seem to be related to human activities. Theoretical values for the vertical distributions of HNO₃ degree fairly well with observations for altitudes higher than 15 km, while estimates below 12 km exceed measured values. Measurements of the chemically related odd nitrogen molecules in the atmosphere are a particularly good test for models designed to predict possible modifications to the stratosphere under natural and artificial constraints.

51717

APTIC NO. 74036

51715

Assaf, G. and Y. Tzur

MEASUREMENT OF THE CAPACITY OF URBAN AIR FOR POLLUTION USING NATURAL RADIOACTIVITY. Israel J. Earth-Sci., 23(4):139-144, 1974. 6 refs.

Experiments to determine if natural radioactivity can be used to predict the capacity of urban air for pollution were conducted by collecting lower atmospheric aerosols which contained decay products of Radon isotopes at two locations in Tel Aviv. The lead-212 concentration varied between 0.04 and 2 picoCurie/cu m, and the lead-212 to bismuth-212 activity ratio was between 1 and 10. The measurements verified a substantial local emanation of thoron (Rn-220) which modifies the above quantities. A two-layer numerical diffusion model for Pb-212 and Bi-212 distribution in a coastal urban boundary layer under maritime wind conditions was constructed and indicated that these natural tracers can be employed to measure the mixing rates between the air in the street layer and the advective layer as well as the diffusivity in the advective layer. These parameters together with wind speed can be used to determine the capacity of urban air for pollution. (Author abstract modified)

51716

APTIC NO. 75133

Blumenthal, D. L., W. H. White, R. L. Peace, and T. B. Smith

DETERMINATION OF THE FEASIBILITY OF THE LONG-RANGE TRANSPORT OF OZONE OR OZONE PRECURSORS (FINAL REPORT). Meteorology Research, Inc., Altadena, Calif., Office of Air and Waste Management Contract 68-02-1462, Rept. EPA-450/3-74-061, 230p., Nov. 1974. 31 refs.

NTIS: PB 241 159/AS

The long-range transport of ozone or its precursors was analyzed for the Los Angeles and Denver regions. An examination of data from the July 25, 1973 smog episode in Los Angeles revealed that ozone was being exported from the western, heavily urbanized portion of the basin at rates exceeding 100 metric tons/hr during much of the afternoon. High ozone concentrations confined to the surface mixing layer in the relatively remote mountain and desert areas east and northeast of Los Angeles were documented and traced back to their probable source in the Los Angeles Air Basin. The stability of ozone at elevated concentrations was documented by observations in the Los Angeles Air Basin during July 26-27, 1973 which revealed a layer of aged polluted air above the surface mixing layer, with ozone concentrations which remained undiminished at 0.12-0.13 ppm throughout the night. Standard diffusion estimates based on one episode indicated that over flat terrain and in the absence of scavenging mechanisms an ozone source the size of the Los Angeles metropolitan area is capable of causing ozone concentrations to exceed the Federal standard of 0.08 ppm at locations as far away as 260 km. The distance over which ozone was transported in the Denver area was much smaller than that for the Los Angeles area. A detailed discussion of the aging of polluted air masses in the Denver area is presented in an appendix. (Author abstract modified)

51717

APTIC NO. 74040

Brosset, Cyril

INTRODUCTORY COMMENTS ON SULPHUR DIOXIDE AND ACIDIFICATION MADE AT THE IVL-CONFERENCE IN STOCKHOLM ON 11TH DECEMBER, 1973. Swedish Water and Air Pollution Research Lab., Gothenburg, Rept. B.186, 4p., Feb. 1974.

Acidification of atmospheric precipitation by sulfur dioxide is discussed in terms of dry deposition and reversible and irreversible washout. Acidification by dry deposition occurs when gaseous SO₂ meets with wet surfaces on the ground or in the air. Dissolution of the SO₂ in these receptors results in the formation of sulfuric acid, with the oxidation being enhanced if catalytic particles such as iron are present in the

receptors. Acidification via reversible washout occurs when SO₂ contacts a pure water drop. If such a drop passes through a smoke plume with a higher SO₂ concentration, more SO₂ is dissolved in the rain drop. Beneath the plume the SO₂ concentration is less, and the water drop releases gaseous SO₂ to the air. The SO₂ dissolved in the raindrop is capable of being oxidized to sulfuric acid if deposited on a receptor, with the acid donating protons to the water of the receptor. Acidification through irreversible washout occurs when an SO₂ molecule hits a water drop that is already catalytically active; the SO₂ is instantaneously transformed to sulfuric acid.

51718

APTIC NO. 73676

Cermak, J. E., J. B. Wedding, R. S. Thompson, and D. J. Lombardi

EFFECTS OF CITY GEOMETRY UPON CONTAMINANT DISPERSION IN CITY STREETS. In: *Environmental Contamination Caused by Lead (Interim Report)*. Colorado State Univ., Fort Collins, National Science Foundation Grants GI-34813X1 and GI-44423, p. 58-136, Dec. 31, 1974. 25 refs.

The effects of city geometry on the dispersion of automobile exhaust lead in city streets were studied in a wind tunnel using two line sources of krypton-85 and a 1:200 scale model of an idealized city with uniform blocks. The resulting concentration distributions were obtained by sampling on the building faces, at street level, and vertically above street canyons. The results were superimposed to yield concentration profiles over the extent of the model. Laboratory measurements showed levels of contamination seven blocks downwind from a source to be on the order of a hundredth the level over the street containing the source. The plume at a distance seven blocks downwind was three blocks wide. A 1:400 scale model of downtown Fort Collins, Colorado was also constructed, and direct comparisons were made between field measurements of lead concentrations and laboratory results. Although the site-of-concentration data revealed similar trends, only one set of field data was available, making a valid comparison impossible.

51719

APTIC NO. 73680

Corrin, M. L.

ATMOSPHERIC CHEMISTRY. In: *Environmental Contamination Caused by Lead (Interim Report)*. Colorado State Univ., Fort Collins, National Science Foundation Grants GI-34813X1 and GI-44423, p. 258-311, Dec. 31, 1974. 33 refs.

Studies of the atmospheric chemistry of automotive exhaust are reviewed. Topics covered include: the role of raw and iodine-treated automobile exhaust as a source of ice nuclei, the heterogeneous chemistry of the natural stratosphere, the detection of lead alkyls in the lower atmosphere of urban environments, and the washout of lead-containing automobile exhaust particulates. A sampling technique and gas chromatographic analytical method sensitive to the picogram level are described along with their use during field measurements of lead compounds in urban environments.

51720

APTIC NO. 74237

Cunnold, Derek M.

TRANSPORT PROCESSES AND TRACE CONSTITUENTS IN THE STRATOSPHERE (ANNUAL PROGRESS REPORT). Massachusetts Inst. of Tech., Cambridge, Dept. of Meteorology, Atomic Energy Commission Contract AT(11-1)-2249, 84p., March 15, 1974. 44 refs.

NTIS: C00-2249-3

The effects of supersonic transport aircraft on the stratosphere are discussed in terms of a photochemical model of stratospheric ozone distribution and the heating effects of SST aerosols. A general circulation model being developed with the ultimate objective of assessing the effect of SST operations on atmospheric ozone distribution is used to simulate the unper-

turbed global ozone distribution. The model shows the presence of a westerly stratospheric jet in the winter hemisphere with an amplitude similar to that observed in the polar night jet; easterlies dominate in the summer hemisphere. The model also shows ozone to be transported polewards and downwards. The annual cycle in ozone concentrations at mid-latitudes is also simulated. Estimates of the diurnal net heating or cooling of the stratosphere due to the presence of aerosols (sulfuric acid and SST soot) are also presented. Heating by the absorption of direct, visible radiation is the dominant term in the net aerosol heating calculation, and this causes a net heating of the stratospheric gases in the 15 km region by both sulfate and soot-like aerosols. The heating depends primarily on the value of the complex index of refraction and the particle concentration. The SST sulfate aerosol heating at 15 km is approximately 0.05 K/day which is much smaller than gaseous heating. Maximum heating by soot particles is estimated at 0.001 K/day for the North Atlantic region. (Author abstract modified)

51721

APTIC NO. 73677

Edwards, H. W., D. R. Watkins, B. J. Benedict, C. D. Gaige, and G. R. Johnson

SIMULATION OF SHORT-RANGE ENVIRONMENTAL TRANSPORT OF AUTOMOTIVE LEAD. In: *Environmental Contamination Caused by Lead (Interim Report)*. Colorado State Univ., Fort Collins, National Science Foundation Grants GI-34813X1 and GI-44423, p. 137-170, Dec. 31, 1974. 23 refs.

Mathematical modeling studies of the short range transport and accumulation of lead in the vicinity of highways are described. Linear, first-order, ordinary differential equations with variable transfer coefficients computed from experimental data are used to formulate the model, and a second-order Runge-Kutta numerical integration scheme is applied to obtain the results. Inputs consist of initial conditions, physical system characteristics, meteorological parameters, and source characteristics; and the output appears in the form of amounts of lead in various sectors of the environment as functions of time and space. Approximately 56% of the total amount of lead consumed succumbs to gravitational settling and is deposited in soil within 100 m of a highway according to the model; approximately 22% is accounted for by longer range transport. Comparisons with limited field data indicate that the model overpredicts soil lead concentrations by about 20%. Incorporation of the gasoline-lead phase-down schedule promulgated by the Environmental Protection Agency into a simplified macroscopic lead transport and accumulation model indicates that lead input to soil in the region up to 100 m downwind of a roadway is about 43% less than that occurring without the phase-down over the same 10-year period.

51722

APTIC NO. 73867

Edwards, H. W., R. J. Rosenvold, and H. G. Wheat

LEAD ALKYL - PARTICULATE INTERACTIONS. In: *Environmental Contamination Caused by Lead (Interim Report)*. Colorado State Univ., Fort Collins, National Science Foundation Grants GI-34813X1 and GI-44423, p. 312-323, Dec. 31, 1974. 13 refs.

The exposure of simulated atmospheric dust components to air streams doped with tetraethyl lead, both in the presence of water vapor, resulted in the uptake of lead by the solids. Lead uptake on a specific surface area basis was greatest for graphitized carbon black substrate, followed by carbon black, aluminum oxide, and silicon dioxide. Sorbed lead was only very slowly removed upon aging. A major effect of aging exposed samples was the conversion of a substantial portion of the sorbed lead compounds into species that were not removed with normal-hexane extraction or moderate heating. Sorption of organic lead compounds on atmospheric dust components thus appears to represent a significant scavenging mechanism, and atmospheric particulates appear to serve as substrates for the conversion of sorbed organic lead to inorganic lead compounds. (Author abstract modified)

51723

APTIC NO. 74026

Fulkerson, W., W. D. Shults, and R. I. Van Hook (eds.)

ECOLOGY AND ANALYSIS OF TRACE CONTAMINANTS (PROGRESS REPORT). Atomic Energy Commission, Oak Ridge, Tenn., Oak Ridge National Lab., National Science Foundation Interagency Agreement AG 389, Rept. ORNL-NSF-EATC-11, 180p., Dec. 1974. 164 refs.

Studies of the environmental impact of atmospheric trace contaminants are reported. Basic areas of research covered include: the development and application of a unified transport model for trace contaminants, ecological research to characterize the translocation and accumulation of trace elements in the environment, the development of improved analytical methods, the design of advanced aqueous abatement technology featuring recycle, and information flow and management. Specific research activities reported include: studies of the input of sulfur dioxide to Walker Branch Watershed from neighboring steam plants and of the input and outflow of trace elements at this forested ecosystem; studies of lead, copper, cadmium, and zinc at the Crooked Creek Watershed near a lead smelting mining complex in the New Lead Belt of southeastern Missouri; investigations of the transport and biological accumulation of mercury in the Holston River-Cherokee Reservoir system in Virginia and Tennessee; and the analytical characterization of materials from various coal-conversion pilot plants.

51724

APTIC NO. 73678

Grant, L. O.

INADVERTENT WEATHER MODIFICATION. In: *Environmental Contamination Caused by Lead (Interim Report)*. Colorado State Univ., Fort Collins, National Science Foundation Grants GI-34813X1 and GI-44423, p. 171-186, Dec. 31, 1974. 11 refs.

Studies investigating the nature of nuclei activation when automobile exhaust is exposed to iodine and of inadvertent weather modification resulting from the effect of exhaust constituents on sub-cooled water cloud precipitation processes are reviewed. Lead, which is present in the form of lead bromide in auto exhaust, does not appear to be the source of ice nucleants when the exhaust is exposed to iodine. The nucleation appears to occur on particulate material, with the ice nuclei produced being organic in nature. The decay of ice nuclei formed in automotive by-products is quite rapid during a period of a few hours and is particularly fast when the exhaust materials are exposed to iodine in the presence of direct sunlight. Studies of the role of automobile exhaust in establishing the precipitation efficiency of sub-cooled water clouds and cloud systems indicate that raw exhaust compounds are very inefficient as ice nucleants at temperatures warmer than about -18 F; at colder temperatures, exhaust constituents become progressively better ice nucleants. Field observations of the spatial and temporal distributions of inadvertent ice nuclei are in the process of being conducted to bridge the gap between laboratory findings and the implications of these findings in terms of inadvertent weather modification.

51725

APTIC NO. 74030

Hake, R. D., Jr. and E. T. Pierce

STRATOSPHERIC ELECTRICITY (SCIENTIFIC NOTE B). Stanford Research Inst., Menlo Park, Calif., Navy Contract N00014-C-0134, Proj. SRI 3062, 8p., Dec. 1974. 14 refs.

NTIS, DDC: AD A002510

The possible influence of atmospheric aerosols on stratospheric electrification is discussed, with particular emphasis on the formation of nuclei from gas phase constituents of supersonic aircraft exhaust. Stratospheric Aitken nuclei are capable of forming in the presence of water and gaseous components such as sulfur dioxide and ammonia. The presence of cluster ions which acts as primary nuclei encourages the gaseous reactions. Sulfur dioxide from SST aircraft can be transformed

into sulfuric acid which is strongly hygroscopic and produces aerosols by the accretion of water molecules. The generation of aerosols from SO₂ and H₂O within SST exhaust trails is estimated to be about 100 times as fast as aerosol production by direct soot injection, even at only a 1% aerosol formation efficiency. Aerosols generated by exhaust gases appear capable of raising the total stratospheric aerosol density to 2000 particles/cu cm, a value which can result in marked changes in the stratospheric electrification.

51726

APTIC NO. 74193

Hayakawa, Kazuya and Masaharu Kaneshima

AN ENVIRONMENTAL PLAN FOR AIR CONDITIONING BY A COMPUTER - ON AN AIR ENVIRONMENTAL MODEL. (Konputa niyoru chiikireiboyu kankyo Keikaku). Text in Japanese. Preprint, Japan Society of Heating, Air Conditioning, and Sanitary Engineers, p. 175-178, 1974. 4 refs. (Presented at the Japan Society of Heating, Air-Conditioning, and Sanitary Engineers Annual Meeting, Tokyo, Japan, Oct. 7-8, 1974.)

The emission concentration, effective stack height, diffusion value, K value, and individual and area pollution ratios for industrial air conditioning plants were calculated by computer programming using environmental models. The air pollution concentration was very high even when individual K values were within given limits. A simple limit of the K value was not sufficient since it was based on the Sutton equation for a given wind velocity of 6 m/sec. Area air conditioning plants showed much higher pollution concentrations than individual plants. High air pollution values were recorded at a height of 50 m in the vicinity of the plants.

51727

APTIC NO. 74203

Ito, Masashi, Saburo Fukuoka, Toshio Odaira, and Masayasu Muraoka

EXAMINATION OF AN OXIDANT CONCENTRATION STATISTICAL PREDICTION MODEL. (Okishidanto nodo no tokeiteki yosoku moderu no kento). Text in Japanese. In: Tokyo Metropolitan Research Institute for Environmental Protection Studies On Tokyo Smog. Rept. 3, p. 512-519, March 1974.

Prediction models which yield average oxidant concentrations for the daytime are proposed. Variables used in the models are the pollutant concentrations and meteorological parameters of the morning. Nitrogen oxide and hydrocarbon concentrations and wind velocity are the most influential independent variables in the prediction models. The models use multiple regression analysis.

51728

APTIC NO. 74176

Izawa, Y., H. Otani, Y. Fukazu, and C. Yamanaka

OBSERVATION OF EXHAUST GAS FLOW BY LASER RADAR. (Reza reda ni yoru haienryu no kansoku). Text in Japanese. Preprint, Japan Inst. of Electrical Engineers, Tokyo, p. G279, 1974. (Presented at the Japan Institute of Electrical Engineers, Kansai Branch Meeting, Kyoto, Japan, Nov. 1974, Paper G10-23.)

Smoke diffusion from a 150-meter tall chimney was studied using a mobile mie scattering technique. The mobile station was equipped with a Q switched ruby laser with a maximum output of 30 MW, a pulse width of 50 nanoseconds and a pulse rate of 0.1 pulses/sec. Both vertical and horizontal smoke diffusion patterns were plotted from data collected within a 500-meter radius of the chimney. The effective chimney height was calculated using several theoretical methods and was compared with the observed height. Both Bosanquet I and II methods gave good agreement between calculated and observed heights.

51729

APTIC NO. 73758

Jernelov, Arne B.

MERCURY FALL-OUT FROM THE ATMOSPHERE WITH SPECIAL REFERENCES TO STUDIES OF SWEDISH CHLORALKALI PLANTS. Swedish Water and Air Pollution Research Lab., Stockholm (Sweden), Rept. B 210, 17p., Sept. 1974.

Snow samples at various distances from five chlor-alkali plants in Sweden were analyzed for mercury to investigate the amount of fall out of the metal. Mercury levels were generally around 2.0 ppb within a few hundred meters of the plants and fell exponentially with distance to levels of around 0.20 ppb after 5 km distance. Only a small portion of the total mercury emitted appeared to be deposited; the remaining mercury probably contributed to regional or global background levels.

51730

APTIC NO. 73714

Johnston, Harold S. and Edward Quitevis

THE OXIDES OF NITROGEN WITH RESPECT TO URBAN SMOG, SUPERSONIC TRANSPORTS, AND GLOBAL METHANE. Preprint, 35p., 1974. 23 refs. (Presented at the Radiation Research International Congress, 5th, Seattle, Wash., July 14-20, 1974.)

A realistic natural background distribution for ozone and nitrogen oxides along with a single set of reaction rate constants are used to evaluate the crossover point in the atmosphere where ozone formation and destruction balance each other. Nitrogen oxides and hydrocarbons produce ozone in urban atmospheres via photochemical smog reactions, while NOx in the stratosphere (from supersonic transports) destroy ozone. A uniform calculation from the surface of the earth to the top of the stratosphere evaluates the role of natural methane in a global smog reaction and locates the crossover height (where NOx forms ozone just as fast as it destroys it) at 13 km (45 deg latitude). The different role of NOx in the lower troposphere and the stratosphere is the natural consequence of the different solar radiation fields in these two regions. (Author abstract modified)

51731

APTIC NO. 73675

Katen, P. C., E. R. Reiter, T. Henmi, and G. J. Schewe

ATMOSPHERIC TRANSPORT OF LEAD. In: *Environmental Contamination Caused by Lead (Interim Report)*. Colorado State Univ., Fort Collins, National Science Foundation Grants GI-34813X1 and GI-44423, p. 14-57, Dec. 31, 1974. 41 refs.

Studies involving the atmospheric transport of lead are reviewed. An urban model which satisfactorily predicts the lead levels measured over an urban-suburban sampling area allows for a series of diffuse sources to be represented as an area source which in turn is transformed into an equivalent Gaussian plume model for longer range diffusion. The model is designed around the idea of studying the intermediate transport range (10-20 km) of lead from automotive sources. Based on area measurements and model predictions, approximately 45% of the consumed lead is still airborne at the suburban edge of a city. Long-range transport studies involving the construction of a one-dimensional and steady state model of a cumulus cloud bear out, at least qualitatively, the observation that the concentration of pollutants in rain water decreases with increasing rain-fall rate. The dynamics of clouds appear to be as important as the scavenging coefficient in controlling the concentration of pollutants in rainwater.

51732

APTIC NO. 73849

Kiang, C. S., V. A. Mohnen, D. Stauffer, P. Hamill, and G. H. Walker

REMOVAL PROCESSES OF ATMOSPHERIC AEROSOLS AND GASES INVOLVING NUCLEATION MECHANISMS. Preprint, National Center for Atmospheric Research, Boulder, Colo., State Univ. of New York at Albany, Albany Atmospheric Sciences Research

Center, Inst. of Theoretical Physics (West Germany), and Atlanta Univ. Center, Georgia, Center for Environmental and Resource Study, 22p., 1974. 35 refs. (Presented at the Precipitation Scavenging Proceedings, 1974.)

Various nucleation processes and their role in the removal of atmospheric aerosols and gases are discussed. Heteromolecular nucleation processes appear to be responsible for aerosol formation for relative humidities below 100%, whereas homomolecular heterogeneous nucleation processes are responsible for the formation of cloud droplet and ice crystals at relative humidities greater than 100%. The following parameters, in addition to humidity, must be identified in order to establish the specific role of nucleation in removal processes: the concentration level of the chemical constituent, the surface area of pre-existing aerosols, chemical reaction rates, and the size of pre-existing particles. A quantitative order-of-magnitude calculation for the removal of sulfur dioxide at a relative humidity below 100% by gas-to-particle conversion involving homogeneous heteromolecular nucleation is presented. (Author abstract modified)

51733

APTIC NO. 73874

Mery, P., J. P. Schon, and J. Solal

COMPARISON OF THERMALLY NEUTRAL AND UNSTABLE SHEAR FLOWS IN THE WIND TUNNEL AND THE ATMOSPHERE. *Advan. Geophys.*, vol. 18B: 273-287, 1974. 26 refs.

The Monin and Obukhov similarity theory was used to compare thermally neutral and unstable shear flows obtained from wind tunnel experiments and atmospheric data. An atmospheric layer having horizontal and vertical dimensions of 1 km by 100 m and transfer properties of the same nature as in the wall region of a turbulent boundary layer on a flat plate was simulated. Laboratory and atmospheric data on the constant stress layer: proved similar, indicating that the transfer processes of momentum, heat, and mass are basically of the same nature. (Author conclusions modified)

51734

APTIC NO. 73766

Mills, M. T., R. C. Dahlman, and J. S. Olson

GROUND LEVEL AIR CONCENTRATIONS OF DUST PARTICLES DOWNWIND FROM A TAILINGS AREA DURING A TYPICAL WINDSTORM. Oak Ridge National Lab., Oak Ridge, Tenn., Computer Sciences Div., Atomic Energy Commission Contract W-7405-eng-26, Rept. ORNL-TM-4375, 66p., Sept. 1974. 10 refs.

An atmospheric transport model for predicting the wind-induced suspension of toxic particulates deposited on a ground surface is described. The threshold wind speed for the onset of saltation (the rolling and bouncing of individual grains across the surface) is found by setting the moment about the sand grain pivot point due to the particle weight equal to the moment due to the drag force. The ground level air concentration of dust downwind from a tailings site can be calculated by using a Gaussian plume equation with a modification to account for plume depletion due to dry deposition. Application of the model to the wind-induced suspension of a uranium mill tailings pile results in estimated values that are within a factor of 2-15 of those observed. The results obtained at three stations are not inconsistent with the model predictions, considering the fact that the saltation ratio may easily vary by an order of magnitude from one site to another.

51735

APTIC NO. 74139

Murata, Motohide, Yoshimasa Kaizu, Hirohisa Shima, Yoshihisa Nagai, Hozumi Tamura, and Masahito Kimoto

EXAMINATION OF AUTOMOTIVE EMISSION GAS DISPERSION MODELS. (*Jidosha Haishutsu gasu no kakusan moderu no kento*). Text in Japanese. Mie-ken Kogai Senta Nenpo (Mie Prefect. Pub. Nuisance Center Annu. Rep.), no. 2:26-30, March 1974. 16 refs.

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A dispersion equation for calculating the average yearly nitrogen oxide emissions from automobile exhaust in the Yokkaichi region, Mie Prefecture, Japan was formulated. The Pasquill and Sutton equations for point source and line-source dispersion were modified for area-source dispersion models, and dispersion parameters suitable to the Yokkaichi region were used. Within the postulated theoretical limits, a correlation coefficient of 0.95 was obtained.

51736

APTIC NO. 71890

Rindsberger, M.

ANALYSIS OF MIXING DEPTH OVER TEL AVIV.

Israel J. Earth Sci., 23(1-2):13-17, 1974. 3 refs.

Routine radiosonde observations taken at about 8 km east of Tel Aviv during the period 1965-1968 were analyzed to estimate the mixing depths over the city in an effort to determine its potential for air pollutant dispersion. Calculations were based on individual observations as well as on monthly and seasonal means. A characteristic annual pattern similar to that of Los Angeles was observed, especially during the mornings and afternoons during the months of May to August. During these months, the morning mixing depths over Tel Aviv were relatively higher than for the rest of the year (median of about 400 m), whereas the afternoon mixing depths were relatively lower (median of about 650 m). The similarities between the mixing depth patterns of Tel Aviv and Los Angeles are significant since both cities have a similar insolation regime, a major factor in photochemical smog formation.

51737

APTIC NO. 74266

Rowland, F. S. and Mario J. Molina

CHLOROFLUOROMETHANES IN THE ENVIRONMENT.

California Univ., Irvine, Calif. Dept. of Chemistry, Atomic Energy Commission Contract AT(04-3)-34, P.A. 126, Rept. 1974-1, 158p., Sept. 5, 1974. 121 refs.

A study is presented on the photoprocesses of atmospheric chlorofluoromethanes, including their ultimate sinks. Topics covered include: current inventories of atmospheric trichlorofluoromethane and dichlorodifluoromethane, absorption cross-sections for photodissociation of chlorofluoromethanes, mechanisms and quantum yields for photodissociation of CF₂Cl₂ and CFC13, solar irradiation flux versus wavelength and altitude, atmospheric diffusion models, chain reactions in the ozone layer, the chloroxyl chains for decomposition of O₃, abstraction reactions by thermal chlorine atoms, release of Cl atoms by hydroxyl radical attack on hydrogen chloride, methane concentrations at 50 km, rate constants for ClOx reactions with O₃ and oxygen atoms, chain terminating reactions, the importance of symmetrical dioxychloride in the stratosphere, fluorine atom chains, possible removal of chlorofluoromethanes by electron capture and/or ionic reaction, possible chlorofluoromethane removal by reaction with singlet oxygen, hydrolysis of chlorofluoromethanes, possible reactions of chlorofluoromethanes with aerosol particles in the stratosphere, calculated O₃ depletion by chlorine-containing species, multi-dimensional calculations, feedback in the ozone depletion calculation, increased odd oxygen production with O₃ depletion, time delay effects in the appearance of O₃ depletion, time concentration patterns with a one year step function injections of CF₂Cl₂ and for several hypothetical models of chlorofluoromethane release stratospheric concentrations from CF₂Cl₂ injected by 1975, estimates of consequences for two different manufacturing patterns for CF₂Cl₂ between 1975 and 1990, current stratospheric levels of chlorine-containing compounds, possible biological and climatological effects of stratospheric O₃ depletion, and observable trends in the average O₃ concentration of the atmosphere.

51738

APTIC NO. 71833

Sato, I.

THE RELATIONSHIP OF METEOROLOGICAL CONDITIONS TO OXIDANT CONCENTRATION IN OSAKA.

(Osaka ni okeru okishidanto nodo to kisho joken tono

kankei). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):573, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 422.)

The relationship between meteorological elements and oxidant concentrations (as an indicator of smog) was analyzed using data obtained at the Osaka District Meteorological Observatory. The data used were obtained during the period of May to Oct. 1973. Relationships between oxidant concentration and surface wind velocity, wind direction, and wind velocity by season and wind direction were analyzed. A linear relationship was found between average oxidant concentration and temperature at 12:00, and the relationship between oxidant concentration and minimum temperature at 12:00 by concentration ranks were tabulated. The relationship to humidity was analyzed in terms of minimum humidity on high oxidant concentration days. A negative correlation was found between oxidant concentration and visibility in August; the visibility was less than 10 km at oxidant concentration higher than 0.20 ppm and less than 5 km at oxidant concentration higher than 0.25 ppm. The relationships between oxidant concentration and stability of the lower atmosphere, wind velocity in the upper atmosphere, pressure gradient, and insolation intensity were also analyzed.

51739

APTIC NO. 72020

Shimazaki Tatsuo and Toshiro Ogawa

A THEORETICAL MODEL OF MINOR CONSTITUENT DISTRIBUTIONS IN THE STRATOSPHERE INCLUDING DIURNAL VARIATION.

J. Geophys. Res., 79(24):3411-3423, Aug. 20, 1974. 106 refs.

A technique of modeling vertical distributions of various neutral minor constituents in the stratosphere is discussed and steady state distributions and diurnal variations are calculated. A steady state solution was calculated for the solar zenith angle fixed at the daytime average. Effects of nitrogen oxides (nitric oxide and nitrogen dioxide) and hydrogen oxides (hydroxides and HO₂-radicals) on the ozone density were investigated by using different rate constants for the reactions of O₃ with hydrogen oxides. The loss rate of O₃ by these reactions is comparable with the loss rate by the NOx chemistry in the stratosphere below 20 km. The nitrogen trioxide chemistry could be important in the very low stratosphere. The practical estimate of the reduction of O₃ in the stratosphere by NOx ejected from the supersonic transport needs the development of two or three dimensional models. (Author abstract modified)

51740

APTIC NO. 73937

Vadot, L.

STUDY OF AIR POLLUTION IN COASTAL ZONES.

(Etude de la pollution dans les zones cotieres). Text in French. Pollut. Atmos., no. 63:307-314, July-Sept. 1974.

Observations and model studies on the behavior of flue gas plumes under conditions of land and sea breezes in coastal zones are presented. With a sea breeze, low-altitude emissions are kept within a narrow convection layer and are easily dispersed upward. High-altitude emissions are, however, contained in the maritime air masses due to the inversion layer. In a land breeze, low-altitude emissions are prevented from dispersion, while high-altitude emissions can diffuse upward. High-altitude emissions may diffuse in a direction opposite of, or substantially deviating from, the direction of the breeze at ground level.

51741

APTIC NO. 71569

Widhopf, George F. and Thomas D. Taylor

NUMERICAL EXPERIMENTS ON STRATOSPHERIC MERIDIONAL OZONE DISTRIBUTIONS USING A PARAMETERIZED TWO-DIMENSIONAL MODEL.

Preprint, Dept. of Transportation, Washington, D. C., 38p., 1974. 38 refs. (Presented at the Climatic Impact As-

assessment Conference, 3rd, Cambridge, Mass., Feb. 26-March 1, 1974.)

A time-dependent, two-dimensional meridional model of stratospheric ozone distributions is developed and the effects of supersonic transport emissions on total ozone distribution is investigated. The model incorporates parameterized large scale eddy transports as well as parameterized mean meridional circulation. Comparisons between calculations run to a steady state for various seasons and available measurements for both the meridional distribution of the total ozone column and vertical profiles of ozone at various latitudes provide an initial assessment of the adequacy of the model for determining trace specie distributions in the natural atmosphere as well as subsequent effects resulting from the deposition of SST pollutants. Results obtained from a Chapman chemical model which includes nitrogen oxides are in good agreement with reported ozone observations. Preliminary calculations of the effect of SST exhaust emissions on the meridional total ozone distribution show a marked meridional variation for the case where they are injected in a typical North Atlantic flight corridor. The resultant globally averaged decrease in total ozone column is in good agreement with a corresponding one-dimensional result. (Author abstract modified)

51742

APTIC NO. 71570

Widhopf, George F.

MERIDIONAL DISTRIBUTIONS OF TRACE SPECIES IN THE STRATOSPHERE AND THE EFFECT OF SST POLLUTANTS. Preprint, American Geophysical Union, Washington, D. C., 51p., 1974. 67 refs. (Presented at the American Geophysical Union, Fall Annual Meeting, San Francisco, Calif., Dec. 12-17, 1974.)

A time-dependent meridional model of the distribution of stratospheric trace species is developed, and changes in the chemical structure of the stratosphere resulting from the deposition of supersonic transport pollutants in typical North Atlantic flight corridors are investigated. Steady state distributions of ozone, nitrous oxide, nitrogen dioxide, nitric oxide, and nitric acid are calculated for the fall season in the northern hemisphere and show good agreement with data from atmospheric observations. Supersonic transport studies show significant decreases in the total ozone column in both hemispheres for a deposition of 1.65 times 10 to the 12 g of NO₂ per year in flight corridors centered at 50 degrees north latitude and 20 and 17 km, respectively. The average northern hemisphere ozone depletion is approximately a factor of 3.3 higher than the corresponding average depletion in the southern hemisphere. Deposition of SST pollutants at an altitude of 17 km results in the same relative meridional variation as in the 20 km flight corridor case, except that the magnitude of the ozone depletion is uniformly decreased by one-third. The location of the initial deposition of pollutants affects the global average decrease in ozone concentration as well as the meridional variation. (Author abstract modified)

51743

APTIC NO. 73963

California Air Resources Board, Sacramento, Calif., Land Use Planning Program

METEOROLOGICAL PARAMETERS FOR ESTIMATING AIR POLLUTION POTENTIAL IN CALIFORNIA (STAFF REPORT). Dept. of Housing and Urban Development Grant CPA 1032.207, CPA-CA-09-39-1032, 62p., July 1974. 4 refs.

NTIS: PB 237869

The Holzworth diffusion model was applied to an expanded meteorological data base to quantify the potential for urban air pollution in seven locations throughout the state of California. Parameters calculated were morning mixing heights, morning wind speed, air pollution potential, and percentile groupings of air pollution potential. The method was applied only to primary pollutants and was not related to such secondary pollutants as photochemical oxidants which require considerably more

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complex treatment. Data are presented in the form of graphical and tabular formats. (Author summary modified)

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APTIC NO. 75127

Pennsylvania State Univ., University Park, Select Research Group in Air Pollution Meteorology

SELECT RESEARCH GROUP IN AIR POLLUTION METEOROLOGY, SECOND ANNUAL PROGRESS REPORT: VOLUME II. Environmental Protection Agency Grant R-800397, Program Element 1AA009, Task 14, ROAP 21ADO, Rept. EPA-650/4-74-045-b, 424p., Sept. 1974. 30 refs.

NTIS: PB 241 391/AS

Research studies in air pollution meteorology are reported. Topics presented include: the development of mesoscale air pollution prediction models; modeling of the planetary boundary layer turbulence and structure, the analysis of acdar signals for wind and temperature measurements in the planetary boundary layer, studies of atmospheric aerosol properties and aerosol-atmosphere interactions, surface aerosol measurements in a rural area, and airborne measurements on the urban to mesoscale level of aerosols, turbulence, and radiation. Airborne measurements of aerosols and sulfur dioxide concentrations are specifically illustrated for St. Louis and Keystone, Pennsylvania, respectively. (Author abstract modified)

51745

APTIC NO. 75131

Pennsylvania State Univ., University Park, Select Research Group in Air Pollution Meteorology

SELECT RESEARCH GROUP IN AIR POLLUTION METEOROLOGY, SECOND ANNUAL PROGRESS REPORT: VOLUME I. Environmental Protection Agency Grant R-800397, Program Element 1AA009, ROAP 21ADO, Task 14, Rept. EPA-650/4-74-045-a, 289p., Sept. 1974. 38 refs.

NTIS: PB 241390/AS

Developments in the construction of regional and urban air pollution prediction models are reported. Topics discussed include: the numerical aspects of a three-dimensional regional model and its two-dimensional analog; attempts at forecasting with real data obtained for the Middle Atlantic states; the meshing of regional models with large-scale models, including the results from one-, two-, and three-dimensional meshed grid experiments; a comparison of one- and two-dimensional semi-implicit models with their explicit counterparts; and the initialization requirements and predictability of mesoscale flows. The use of semi-implicit mesoscale models in place of explicit modeling techniques appears to increase computational efficiency by a factor of four.

1973

51746

APTIC NO. 73860

Blumenthal, D. L.

MEASUREMENT OF PHYSICAL AND CHEMICAL PLUME PARAMETERS USING AN AIRBORNE MONITORING SYSTEM. Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., Pacific Northwest International Section, 19p., 1973. 12 refs. (Presented at the Air Pollution Control Association, Pacific Northwest International Section, Annual Meeting, Seattle, Wash., Nov. 28-30, 1973, Paper 73 AP 16.)

The use of airborne sampling systems for the study of point and area source plumes is reviewed. For most continuous monitors with response times of a few seconds, reliable plume concentration information can be obtained from the recorded data by using appropriate numerical procedures. Grab samples, which can be taken at a single point in the plume or in an integrated manner during several passes through the plume, are often desirable for chemical and microscopic analysis or for transformation and reaction rate studies. Aerosol sensors are

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valuable tools for almost all types of plume studies; they can be used to locate virtually invisible plumes and to determine plume structure and relative concentrations. Plumes can be tracked visually for some applications, though often the centerline is hard to determine. In the latter case, traverses at several altitudes and downwind distances can be made after reference points for the plume are mapped. The same type of studies conducted on point source plumes can be expanded for defining the characteristics of area source or urban plumes. Plume cross-sectional data coupled with detailed three-dimensional wind data can be used to estimate total flux of a pollutant from a city and thus to determine source strength.

51747

APTIC NO. 73952

Bolle, Hans-Juergen

RESEARCH AND DATA REQUIREMENTS FOR CLIMATE STUDIES. In: *The Implications for European Space Programmes of the Possibilities of Manned Missions, III. Atmospheric Sciences, European Space Research Organization, Alpbach (Austria), Summer School, 38p., 1973, 43 refs.*

NTIS: N74-33347

The use of meteorological satellites for the monitoring of global climatic changes and atmospheric parameters responsible for such changes is discussed. Climatic observations are reviewed in terms of pure radiation quantities (solar radiation and light scattering), quasi-static or primary atmospheric and surface quantities (water vapor, carbon dioxide, ozone, particulates, surface albedo and temperature, and cloud phenomena), and quantities indirectly derived from primary satellite observations (winds, humidity, air temperature, and precipitation). Meteorological satellites presently possess the capability to acquire atmospheric parameters such as temperature, wind, humidity, ozone content, cloud height and movement, radiation balance, solar radiation, and precipitation. It is expected that by the 1980's spaceborne observation platforms will monitor all of the basic atmospheric parameters required for the simulation of atmospheric circulation in numerical forecast models.

51748

APTIC NO. 69618

Cermak, F. E.

PHYSICAL MODELLING OF ATMOSPHERIC FLOW FOR AIR POLLUTION STUDIES. *American Society of Mechanical Engineers, New York, Fluids Engineering Div. and Applied Mechanics, Div., American Society of Mechanical Engineers Meet., Flow Stud. Air Water Pollut., Atlanta, Ga., 1973, p. 67-78, 26 refs. (June 20-22.)*

Similarity requirements for physical modeling of the atmospheric boundary layer are presented and the limitations on meeting these requirements by wind tunnel flows are discussed. Motion in the atmospheric boundary layer can be simulated with sufficient accuracy to make laboratory studies of air pollutant transport useful for planning air pollution control measures. Satisfactory agreement between diffusion characteristics in the simulated and real atmosphere was found whenever field data were available for making comparisons. Pollutant transport over complex terrain may be simulated by using topographic models scaled on the order of 1:10,000 provided that advective transport by the mean surface flow is the dominant transport process. This occurs when a stably stratified atmosphere flows over highly irregular terrain. When the stratification is neutral or unstable, exaggeration of the vertical scale is necessary to preserve dynamic similarity of flow over topographic features. The proper amount of vertical distortion and interpretation of the resulting pollutant concentration distribution must be determined by further research. (Author conclusions modified)

51749

APTIC NO. 73751

Davies, T. D.

DETERMINATION OF THE LOCAL REMOVAL OF SULPHUR DIOXIDE BY PRECIPITATION. *World Meteorological Organization, Geneva (Switzerland) and World Health Organization, Geneva (Switzerland), World Meteorol. Organ./World Health Organ. Tech. Conf. Observ. Meas. Atmos. Pollut., Helsinki, Finland, 1973, p. 567-578, WMO-368, 36 refs. (July 30-Aug. 4, Paper N75 11533.)*

NTIS: N75-11476-540

Laboratory experiments and field studies were performed to determine the extent of local removal of sulfur dioxide as sulfate by washout. A procedure for correcting for the contribution of sulfate to the collected rainwater sample by direct impingement was also developed. Washout values and ground-level atmospheric SO₂ concentrations were averaged by class, a partial correlation coefficient of + 0.21 was computed from 800 observations. Proportions of SO₂ washout (sulfate equivalent) as a percentage of total sulfate ranged from 14-82% with a mean of 47%.

51750

APTIC NO. 73947

Ervio, Raimo and Esko Lakanen

LEAD CONTAMINATION OF SOIL IN THE ENVIRONMENT OF A SMELTER IN SOUTH FINLAND.

(Maan liijysaastuminen sulattamon ymparistossa tikkurilassa.) *Text in Finnish. Ann. Agric. Fenn., 12(3/4): 200-206, 1973, 18 refs.*

Total and ammonium acetate/ethylenediaminetetraacetic acid-soluble lead was analyzed from cultivated and forest soils at 104 sites near a lead smelter and 15 km north of Helsinki, Finland. Total and extractable lead levels of 378 and 212 mg/l soil were found in the plough layer at a distance of less than 500 m from the smelter; this was more than 35 times that found in samples taken 8-35 km from the smelter and about 70 times more than that found in normal field soil in the Finnish countryside. Twice as much lead was found in the surface layer (0-2.5 cm) as in the plough layer (0-20 cm) of grassland soils. The extractable lead content in the plough layer at a distance of 1200-1700 m from the smelter increased nearly 140% between the years 1960 and 1970. As much as 25,000 mg of extractable lead/l soil was found in the litter layer of surface forest soil (0-2.5 cm) at a site 100 m from the smelter. At a distance of 2800 m from the smelter, 47 mg of extractable lead was measured. The ratio of extractable lead to total lead in the soil became greater as the degree of lead contamination increased. Lead was for the most part immobilized in the 0-10 cm layer of forest soil.

51751

APTIC NO. 73955

Frank, Sidney R

REMOTE SENSING OF ATMOSPHERIC INVERSIONS (FINAL REPORT). *Frank (Sidney R.) ... Group, Goleta, Calif., California Air Resources Board Contract ARB 022, Proj. ARB 3-164-2, Rept. ARB-R-022-73-21, 40p., Jan. 31, 1973.*

NTIS: PB 236-423

Techniques for the remote sensing of atmospheric inversions involving the atmospheric ducting of television signals over the ocean and the analysis of 3.5 yr of almost continuous time-lapse radarscope filming were investigated. Both techniques were successful in obtaining atmospheric information for air pollution control without the use of normal meteorological sensors. The occurrence of anomalous propagation on the radarscope was an indication of a low level inversion, and ducting of the electromagnetic signals by large vertical changes in the refractive index was used to calculate mixing depth. A plot of percent of total possible hours of anomalous propagation versus monthly averages of daily maximum hours of oxidant pollution is illustrated.

51752

APTIC NO. 69485

Jessen, W. and P. Fabian

STRATOSPHERIC OZONE CALCULATIONS IN A TWO-DIMENSIONAL MODEL INCLUDING PHOTOCHEMICAL AND TRANSPORT EFFECTS. *Z. Geophys.*, 39(6):1023-1042, Nov. 1973. 32 refs.

The stratospheric ozone cycle in terms of photochemistry, mean meridional circulation, large-scale eddy diffusion, and tropospheric loss processes was treated as a time-dependent problem in a two-dimensional numerical model which combined a modern wet ozone theory with dynamic effects and simple nitrogen oxides chemistry. Circulation data and eddy diffusion coefficients were taken from previous investigators. Annual variations of total ozone were simulated to a sufficient degree of accuracy when wind components of other investigators were multiplied by the proper numerical constant. Maxima were produced in late April and mid October above the North and South Poles, respectively. Equatorial variations were very small. Vertical ozone profiles were reproduced satisfactorily only for mid-latitudes. An artificial nitrogen oxide layer induced a drastic reduction in the ozone shield. (Author summary)

51753

APTIC NO. 71995

Mason, Conrad

METEOROLOGICAL DISPERSION MODELS AND THEIR APPLICATIONS TO AEROBIOLOGICAL PROBLEMS. *United States International Biological Program, Ann Arbor, Mich. Aerobiology Program, Ecol. Syst. Approaches Aerobiology, Proc. Workshop/Conf. III, Further Model Dev., Ann Arbor, Mich., 1973, p. 10-30, 1973, AP-USIBP-H-73-4. 8 refs. (March 28-30.)*

The application of meteorological dispersion models to aerobiological problems is discussed. A Gaussian plume model is examined, and variation in dispersion coefficients with atmospheric turbulence, wind speed, distance from the source, sampling time, and terrain characteristics is analyzed. Modifications to the basic model are discussed for the presence of inversions and the presence of area or line sources. Dry deposition is shown to be the most important loss mechanism for particulates of biological origin. Since the Gaussian plume model is valid only for a region close to the source and for a time period during which no significant changes in any important parameters occur, consideration is given to the Roberts model. This model regards the emission from a source as a series of puffs, each of which undergoes Gaussian diffusion while its center moves with the mean wind. At any point in space, the concentration is determined by the cumulative effect of successive puffs. Thus, the purely diffusive Gaussian plume model can be replaced with a trajectory-diffusion model. An extremely simple dispersion model, Hanna's model, is discussed in terms of its usefulness as a baseline estimator during the evaluation of complex models.

51754

APTIC NO. 73709

Wheatley, G. A.

PESTICIDES IN THE ATMOSPHERE. In: *Environmental Pollution and Pesticides* Clive A. Edwards (ed.), London, England, Plenum, 1973, Chapt. 10, p. 365-408. 125 refs.

The atmospheric entry and fate of pesticides, both in particulate and vapor form, is reviewed. Topics covered include: pesticide transport potential, intermittent entry from point sources, continuous entry, atmospheric concentrations, vapor phase/particulate behavior, removal processes, and redistribution. The prediction of pesticide redistribution and behavior in the atmosphere is difficult because of a lack of knowledge concerning the complex interactions of processes involved. Considerable portions of applied pesticides probably escape into the atmosphere and contaminate air masses at least up to the tropopause under some conditions. Atmospheric circulation effectively redistributes the compounds ubiquitously, and significant amounts of some pesticides and their residues are

present therein in transit. The actual mean residence time in the atmosphere for dichlorodiphenyltrichloroethane (DDT) appears to be much longer than experimental observations suggest, indicating that appreciable recycling of residues may occur between the earth's surface and the atmosphere. (Author conclusions modified)

1972

51755

APTIC NO. 74249

Beaton, John L., Andrew J. Ranzieri, and John B. Skog

AIR QUALITY MANUAL. VOL. I. METEOROLOGY AND ITS INFLUENCE ON THE DISPERSION OF POLLUTANTS FROM HIGHWAY LINE SOURCES (INTERIM REPORT). *California Dept. of Public Works, Sacramento, Div. of Highways, Federal Highway Administration Contract FH-11-7730, Work Unit FCP 33F3032, Rept. FHWA-RD-72-33, CA-HWY-MR6570825(1)-72-11, 168p., April 1972. 20 refs.*

The influence of meteorology on the dispersion of air pollutants from highway line sources is discussed. Topics covered include: sources of meteorological data; meteorological wind systems; the effects of thermal, aerodynamic, and topographical influences on pollutant dispersion; the estimation of atmospheric surface stability; meteorological factors to be considered in highway route location; computer programs for wind roses and stability; and a highway line source model for analyzing meteorological data. Meteorology survey procedures are presented to aid the highway engineer in determining the impact of proposed highway routes on air quality.

1971

51756

APTIC NO. 75334

Kondo, Jiro

PUBLIC NUISANCE CAUSED BY INTERNAL COMBUSTION ENGINES AND ITS CONTROL. (*Naien kikan ni yoru kogai to sono taisaku*). *Japanese Society of Mechanical Engineers, 1971:51-69, Nov. 25, 1971. 11 refs. Translated from Japanese. Scitran Scientific Translation Service, Santa Barbara, Calif., 31p. (Presented at the Japanese Society of Mechanical Engineers, Lecture Meeting, 350th, Nov. 29-30, 1971.)*

A computerized model known as the Air Pollution Prediction System is described that is capable of predicting the effects of automobile exhaust emissions on air pollution levels. The APPS consists of seven subprograms: a traffic model, an emissions model, a road diffusion model, a local diffusion model, an area diffusion model, a photochemical reaction model, and a flow field model. Pollutants considered include: hydrocarbons, carbon monoxide, nitrogen oxides, ozone, and peroxyacetyl nitrates. The subprograms can be used either independently or in combinations. The model is capable of projecting future air pollution levels based on the blue prints of a city plan and is thus useful for evaluating area development plans.

1970

51757

APTIC NO. 75304

Sikata, H.

A STUDY ON THE PREDICTION OF THE ATMOSPHERIC POLLUTION. Preprint, *Central Research Inst. of the Electric Power Industry (Japan), Technical Lab., 21p., Oct. 1970. 9 refs. Translated from Japanese Scitran Scientific Translation Service, Santa Barbara, Calif., 33p.*

Mathematical models for predicting future ground level concentrations of sulfur dioxide around thermal power stations are described. The models apply to the prediction of meteorological conditions which control the diffusion and

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propagation of stack gas, the estimation of SO₂ density distribution resulting from an individual polluting source, and the estimation of SO₂ density distribution resulting from all polluting sources within an industrial area. Local meteorological conditions are predicted using such parameters as pressure gradient, temperature difference between the land and sea, and solar radiation intensity. Ground level pollution distributions from a single source are estimated by calculating the rising altitude of the stack gas and its atmospheric diffusion. A probabilistic model that includes several meteorological parameters is used to compute the ground level concentration of pollutants due to multiple sources. Data on SO₂ concentrations are collected from 17 designated locations and used as input for the model.

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1975

51758

APTIC NO. 75186

Brier, Glenn W.

STATISTICAL QUESTIONS RELATING TO THE VALIDATION OF AIR QUALITY SIMULATION MODELS (FINAL REPORT). Brier (Glenn W.) Consultant, Fort Collins, Colo., Environmental Protection Agency Program Element 1AA009, ROAP 21 ADO, Rept. EPA-650/4-75-010, 24p., March 1975. 6 refs.

NTIS: PB 241866/AS

Statistical problems arising in the validation and evaluation of air quality simulation models are examined. Various scopes or indices that can be used in measuring the predictive accuracy of a model are considered, and it is shown how the verification statistics are affected by errors in the input and output data as well as by imperfections in the model. The mean square error is recommended for use along with the mean bias of prediction to measure the prediction accuracy of the model. It is also desirable to obtain the frequency histogram of the forecast errors where the distributions are not likely to be normal. Useful information for making model comparisons and for diagnosing possible sources of error can be obtained by such statistics as the correlation coefficient, the regression slope, and the intercept. Estimates of the error variance of input data and the observations can be used to separate input-output data errors from those introduced by the model.

51759

APTIC NO. 73976

Drake, R. L.

SIMILARITY SOLUTIONS OF AN AEROSOL BALANCE EQUATION FOR A HOMOGENEOUS MEDIUM. In: Pacific Northwest Laboratory Annual Report for 1974 to the USAEC Division of Biomedical and Environmental Research. Part 3: Atmospheric Sciences. Battelle Memorial Inst., Richland, Wash., Pacific Northwest Labs., Rept. UC-11, p. 81-84, Feb. 1975. 4 refs.

NTIS: BNWL-1950 PT3

Similarity solutions of an aerosol balance equation for a homogeneous medium are discussed. Processes which contribute to the time evolution of the aerosol spectrum are coagulation, particle growth via condensation of vapors and gases on particles, and external sources and sinks of particles. Transformed equations and a short explanation of their solution are given; no solutions are included.

51760

APTIC NO. 73813

Fujieda, Shigeaki, Sakiko Aoki, and Takao Kan

ADSORPTION OF NITRIC OXIDE ON SUPPORTED IRON AND PLATINUM. (Tanji shita hakkin oyobi tetsu jo eno issanka chisso no kyuchaku). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 416, 1975.

51762

(Presented at the Japan Chemical Society Spring Term Annual Meeting, 32nd, Tokyo, Japan, April 1-4, 1975, Paper 1K45.)

Formation of nitrosyl complexes of platinum and iron were evidenced from the electron spin resonance spectra for the reaction products of nitric oxide with platinum and iron, which are used as catalysts for nitrogen oxides reducing reactions. Platinum chloride and ferric nitrate were loaded on gamma alumina or silica gel with the metal wt% of 1, placed in a reaction cell, and reduced under hydrogen gas at 300 C. Five torr of NO gas, generated by the reaction of sodium nitride with ferrous sulfate, was introduced into the reaction cell, and the ESR spectra were taken. Three absorption peaks were observed in the Pt reaction with NO and their g₁, g₂, and g₃ values were 2.068, 2.043, and 2.015 respectively. When carbon monoxide gas was added to the cell and heated, these absorption peaks disappeared. Therefore either ionic or covalent bonding was present between the Pt and NO molecules. For the reaction of Fe and NO, the ESR spectra showed two absorption peaks; g₁ at 2.069 and g₂ at 2.014 which are close to the values reported for the NO coordinated Fe (II) complex.

51761

APTIC NO. 73815

Fujiwara, Hideki, Shozo Itagaki, Tsuneo Shirai, and Saburo Yanagisawa

STUDIES ON THE PHOTOCHEMICAL REACTION IN THE GASEOUS PHASE, PART 1, RESULTANTS IN OLEFIN-NOX-O₂. (Kiso ni okeru kokagaku hanna no kenkyu, sono 1, orefin, NOx, O₂ kei no hanna seseibutsu). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 785, 1975. (Presented at the Japan Chemical Society Spring Term Annual Meeting, 32nd, Tokyo, Japan, April 1-4, 1975, Paper 1037.)

A photochemical reaction was induced by a mercury lamp for the systems of trans 2-butene, 1-butene, 1-pentene, and 1-hexene with oxygen and nitrogen oxides in a 11.24 l reaction cell. After 3 to 4 hr of ultraviolet irradiation, the gas phase was analyzed by a gas chromatography-mass spectrometry combination. The reaction products identified for the system of trans 2-butene were acetaldehyde, acetone, methylethyl ketone, and methyl nitrate. The products for 1-butene were acetaldehyde, propionaldehyde, n-butylaldehyde, acetone, methylethyl ketone, methyl nitrate, ethyl nitrate, and n-propyl nitrate. The products for 1-pentene were acetaldehyde, propionaldehyde, n-butylaldehyde, methyl nitrate, ethyl nitrate, and n-propyl nitrate. The products for 1-hexene were acetaldehyde, propionaldehyde, n-butylaldehyde, n-valeraldehyde, acetone, methyl nitrate, ethyl nitrate, n-propyl nitrate, and n-butyl nitrate.

51762

APTIC NO. 73817

Fujiwara, Hideki, Shozo Itagaki, Tsuneo Shirai, and Saburo Yanagisawa

STUDIES ON THE PHOTOCHEMICAL REACTION IN THE GASEOUS PHASE, PART 2, RESULTANTS IN ALDEHYDE-NOX-O₂ SYSTEM AND KETONE-NOX-O₂ SYSTEM. (Kiso ni okeru kokagaku hanna no kenkyu, sono 2, arudehido, NOx, O₂ kei oyobi keton NOx, O₂ kei no hanna seseibutsu). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 786, 1975. (Presented at the Japan Chemical Society Spring Term Annual Meeting, 32nd, Tokyo, Japan, April 1-4, 1975, Paper 1039.)

A photochemical reaction was induced by a mercury lamp for the systems of propionaldehyde, n-butylaldehyde, n-valeraldehyde, methylethyl ketone, and methyl n-butyl ketone with oxygen and nitrogen oxides in a 11.24 l reaction cell. After the 3 to 4 hr of ultraviolet irradiation, the gas phase was analyzed by a gas chromatography-mass spectrometry combination. The reaction products identified for the system of propionaldehyde were acetaldehyde, methyl nitrate, and ethyl nitrate. These products for n-butylaldehyde were acetaldehyde, propionaldehyde, methyl nitrate, ethyl nitrate, and n-propyl nitrate. The products for n-valeraldehyde were methyl nitrate,

ethyl nitrate, n-propyl nitrate, and n-butyl nitrate. The products for methylethyl ketone were acetone and methyl nitrate. The products for methyl n-butyl ketone were methyl nitrate, ethyl nitrate, and n-propyl nitrate.

51763

APTIC NO. 74222

Gage, Michael I., N. S. Kendrick, Jr., and J. T. Callahan

A MULTIPLEXED VECTORED INTERFACE LOGIC SYSTEM FOR CONTROL OF BEHAVIORAL EXPERIMENTS. *Behav. Res. Methods Instrum.*, 7(2): 187-190, 1975. 5 refs.

A multiplexed vectored interface logic system that transmits digital input and output information between small computers and devices in operant conditioning chambers is described. The interface handles 60 inputs divided into groups of five inputs from each of 12 chambers. A 12-bit output buffer is connected to each of the chambers, and four additional 12-bit buffers are available for controlling additional stimuli. The interface logic consists of three parts: a real-time clock, input recognition circuits, and output buffer circuits. Since the interface scans inputs and controls outputs independently from the computer and with minimum program interaction, the computer can execute complex background programs in real time while still monitoring and controlling animal behavior.

51764

APTIC NO. 73990

Hales, J. M. and J. W. Sloot

CREATION OF A DATA-PROCESSING CODE FOR USE WITH THE BNW AIRCRAFT SAMPLING SYSTEM.

In: *Pacific Northwest Laboratory Annual Report for 1974 to the USAEC Division of Biomedical and Environmental Research. Part 3: Atmospheric Sciences. Battelle Memorial Inst., Richland, Wash., Pacific Northwest Labs., Rept. UC-11, p. 168-169, Feb. 1975.*

NTIS: BNWL-1950 PT3

A new software package for processing data acquired aboard aircraft is described. The software is written in four segments which include: the reading of magnetic tape by a CDC 6600 CYBER computer and the translation and storage in CYBER-compatible form; the preliminary processing of raw data, including the culling of bad data and specific time averaging if desired; final processing and printing of standard data; and final processing and printing of special data. The standard data include: time, indicated temperature, indicated air speed, pressure altitude, carbon-strip humidity sensor data, variable omnirange station data, distance measuring equipment data, and dew-point hygrometer readings. The fourth segment of the software package is an open end which allows the user to incorporate any special data handling for additional raw data inputs. The code is written in a highly user-oriented fashion to facilitate access to the individual researcher.

51765

APTIC NO. 74206

Hirano, Takenori, Takahiro Iwasawa, and Sadao Ogasawara

REACTION MECHANISM BETWEEN NO and NH₃ ON CU-AL₂O₃ CATALYST. (*Cu-Al₂O₃ shokubaijo deno NO to NH₃ no hanno kiko*). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 495, 1975. (Presented at the Japan Chemical Society Spring Term Annual Meeting, 32nd, Tokyo, Japan, April 1-4, 1975, Paper 3K42.)

Ammonia and nitric oxide at 1:1 mole ratio were diluted with argon, and the reaction was carried out in a closed circulation system on copper-alumina catalyst at 150 to 230 °C. The catalyst was prepared by treating copper oxide supported by alumina at 480 °C for 2 hr. Analysis of the reaction products was performed with a mass spectrometer. At 200 °C, nitrogen and nitrous oxide were formed during the initial stage of the reaction. When the catalyst was first covered with NH₃ and the system was degassed before NO was introduced, only N₂ was formed during the initial stage. Variation of NO concentration during the course of reaction did not effect the N₂ and N₂O formations. At 85 °C, infrared analysis showed absorption

peaks due to chemical adsorption after NH₃ was introduced. When NO was introduced and the temperature raised to 200 degrees, the infrared absorption disappeared.

51766

APTIC NO. 74280

Hogan, Austin W.

A SIMPLIFIED AEROSOL COAGULATION MODEL. Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 11p., 1975. 14 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-41.3.)

A simplified aerosol coagulation model was developed to determine the mutual coagulation of six discrete size classes. The model was applied to computation of the growth of light scattering particles from a small monodisperse aerosol and prediction of aerosol size and concentration downwind of sources. These computations are in good agreement with field observations. This model is sufficiently simplified to allow programming in contemporary desk calculators and is an extremely practical tool for application of aerosol technology to air pollution problems. (Author abstract)

51767

APTIC NO. 74218

Honma, Katsunori

PARTICULATE MATTERS PRODUCED BY PHOTOOXIDATION IN THE ATMOSPHERE. (*Kokagaku sumoggu hassei doki no ryushijo bushitsu ni tsuite*). Text in Japanese. *Kuki Seijo (Clean Air - J. Japan Air Cleaning Assoc., Tokyo)*, 12(5):16-26, Jan. 1975. 8 refs.

Particulate matter resulting from photochemical smog reactions was examined by a metal membrane technique and energy dispersion X-ray analysis. Particulates were sampled at Tokyo and Kawasaki. The sampling was performed when photochemical smog occurred. Individual particles were relatively homogeneous and spherical. The particles were jelly-like but became volatile when a strong electron beam was applied during examination by electron microscope. The evaporation resulted in the formation of micro-sized solid particles. When the particles were collected on a metal membrane, damage to the membrane surface occurred, and a non-volatile substance was formed. Energy dispersion X-ray analysis of the corrosive substance showed that it contained a sulfur atom and was possibly an acidic sulfur compound.

51768

APTIC NO. 73880

Hoshika, Yasuyuki, Satoshi Kadowaki, Ichiro Kojima, Kazumi Koike, and Kenji Hoshimoto

ANALYSIS OF SULFUR COMPOUNDS IN CELLOPHANE FACTORY EXHAUST GAS BY GAS CHROMATOGRAPHY AND INFLUENCE OF LIGHT IRRADIATION ON IT. (*Gasu kurumato gurafi ni yoru seizo kotei haiki gasu chu no iou kagobutsu no bunseki to sono hikari shosha no eikyo*). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 777, 1975. (Presented at the Japan Chemical Society Spring Term Annual Meeting, April 1-4, 1975, 32nd, Tokyo, Japan, Paper 1029.)

Sulfur compounds in flue gas from a large cellophane manufacturing plant were analyzed by gas chromatography to determine the effect of sunlight on the sulfur compounds in the flue gas. The flue gas was collected in a 1-liter glass bottle from which the sample gas was prepared by a cold trap method using liquid oxygen. Gas samples with and without exposure to sunlight were both analyzed. The amount of carbon oxysulfide increased, the formation of sulfur dioxide was observed, and the amount of hydrogen sulfide decreased when the sample gas was exposed to sunlight.

51769

APTIC NO. 73776

Ito, Yasuo and Yasuto Mimata

GENERATION OF LOW CONCENTRATION AMINE GAS USING DIFFUSION CELL. (*Kakusan seru ni yoru teinodo aminkei gasu hassei*). Text in Japanese. Preprint,

Japan Chemical Society, Tokyo, p. 814, 1975. (Presented at the Japan Chemical Society Spring Term Annual Meeting, 32nd, Tokyo, Japan, April 1-4, 1975, Paper 2027.)

The generation of amine gas by a diffusion cell is studied for dimethylamine, trimethylamine, diethylamine, and triethylamine. The generated amine vapor is quantitized by gas chromatography with flame ionization detection. An aqueous solution of amines was used in a diffusion cell and air was passed through the cell. The concentration of generated amine gas (ppm) decreased with increased air flow rates, and concentrations in a range between 5 ppm to 200 ppm dimethylamine were linearly obtained by gradually changing the air flow rates. The concentration of amine solution in the diffusion cell also quantitatively changed the generated amine gas concentration. Therefore a wider concentration of amine gas could be obtained by changing both air flow rate and concentration of amine solution. When two amine solutions were mixed and placed in the diffusion cell, the generated gas concentrations of two amines did not change for a few hr, and their gas concentrations were determined by the mixing ratio of amine solutions. However, when the mixture contained smaller amounts of less volatile amines, it showed a slightly decreasing gas concentration with time. Increased air flow also decreased the generated gas concentration for the mixed amine solution.

51770

APTIC NO. 73816

Kagiya, Tsutomu, Yoshimi Uyama, and Katsuo Takemoto

ULTRAVIOLET OXIDATION DECOMPOSITION REACTION OF ATMOSPHERIC VINYL CHLORIDE. (*Kuki chu ni fukurareru enka biniru no shigaisen sanku bunkai hanna*). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 783, 1975. (Presented at the Japan Chemical Society Spring Term Annual Meeting, 32nd, Tokyo, Japan, April 1-4, 1975, Paper 1035.)

The decomposition of vinyl chloride by ultraviolet light was examined using a 650 ml reaction cell. The concentrations of VC studied were 100 ppm, 1000 ppm, and 10,000 ppm, respectively and air was used to dilute the VC. The UV sources used were mercury lamps with different Hg pressures and sunlight, which allowed a study of the decomposition dependence on wavelength. The reaction products were dissolved into 0.1 N potassium hydroxide solution and were analyzed by titrations (for acid and chloride contents), gas chromatography, and mass spectrometry. The VC decomposition at all concentration levels studied proceeded to 100% within 15 min with Hg lamps, and the Hg lamp with shorter wavelength tended to decompose VC faster. The decomposition products identified were hydrochloric acid, monochloroacetaldehyde, monochloroacetyl chloride, formaldehyde, and carbon dioxide, however the last two compounds were not observed unless 100% VC decomposition occurred. The formation of hydrogen chloride was linearly related to the VC decomposition rate. When sunlight was used, 80% of the VC decomposed after two days of irradiation. No reaction products were detected from the gas phase after the reaction cell was washed with KOH.

51771

APTIC NO. 74166

Mano, Yoshikazu, Fumio Matsukawa, and Fumio Nozaki

URANIUM OXIDE CATALYTIC ACTIVITY FOR NO REDUCTION REACTION BY NH₃ AND CO. (*NO no NH₃ oyobi CO kangen hanna ni taisuru sanku urankei shokubai no kassei*). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 496, 1975. 2 refs. (Presented at the Japan Chemical Society Spring Term Annual Meeting, 32nd Tokyo, Japan, April 1-4, 1975, Paper 31543.)

The effects of alkali metals and alkali earth metals on uranium oxide catalytic activity for nitric oxide reduction with ammonia and carbon monoxide were examined. The catalysts used for the study contained alkali and alkali earth metals and uranium at an atomic ratio of 1/2. The reduction was carried out by circulation or pulse methods, and the analysis was by gas chromatography. For the reaction of NO and CO, the

catalysts showed decreasing activity in the order of U-cesium, U-potassium U-sodium, U-calcium, U-magnesium and U. The same effects were not observed for the reaction of NO and NH₃. Nitric oxide conversion was significantly reduced with increasing pulse number for the reaction between NO and NH₃ by O₂ the oxygen pulse method.

51772

APTIC NO. 73779

Matsuda, Toshio, Tsuyoshi Arakawa, Yusaku Takita, Noboru Yamazoe, and Tetsuro Seiyama

CATALYTIC REDUCTION REACTION OF NO, PART II, LOW TEMPERATURE ACTIVITY OF Cu(II) EXCHANGE ZEOLITE CATALYST IN NO-NH₃ SYSTEM. (*NO no sesshoku kangen bunkai hanna, II, NO-NH₃ kei ni okeru Cu(II) kokan zeoraito shokubai no teion kassei*). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 493, 1975. (Presented at the Japan Chemical Society Spring Term Annual Meeting, 32nd, Tokyo, Japan, April 1-4, 1975, Paper 3K40.)

The catalytic activity of metal ion-substituted Y type Zeolite for nitric oxide reduction reaction with ammonia is studied. The metal ions examined are iron (III), copper (II), nickel (II), and lead (II), which are loaded on a Y type Zeolite as individual metal substitutes or as a combination of two different type of metals substituted in the same Zeolite. These sample gas composed of NO, NH₃, and helium was flown through the catalyst bed at rates of 1.8, 1.2, and 57 ml/min respectively and the gas was analyzed by gas chromatography using Molecular Sieve 13X, Porapak Q, or Chromosorb 104 column. The Cu(II) catalyst showed activity from a reaction temperature of 50 C and peaked at 120 C giving an NO conversion of 30%; however, the activity decreased with further increased temperature. The decreased activity was not caused by the destruction of Cu(II) catalyst because the activity was recovered when the reaction temperature was lowered, which was not observed in the Fe(III) and Ni(II) catalysts. The combination catalysts Cu(II)-Ni(II), Cu(II)-Pb(II), and Cu(II)-Fe(III) showed a first peak activity at 120 C and their activities were higher than the Cu(II) catalyst activity; 40%, 55%, and 45% NO conversion, respectively. By increasing reaction temperature further the activities of these combination catalysts showed much higher activity than the Cu(II) activity observed at 120 C when the reaction temperature exceeded 200 C. When ammonia was replaced by hydrogen gas, no Cu(II) catalytic activity was obtained at 120 C. No catalytic activity at 120 C was observed by the Cu(II) catalyst loaded on silica gel. Therefore, the peak activity observed at 120 C is characteristic of the system with Cu(II), Y type Zeolite, NO, and NH₃.

51773

APTIC NO. 73715

Muthukrishnan, S. and L. K. Peters

A MECHANISTIC MODEL FOR PHOTOCHEMICAL SMOG INCORPORATING SULFUR OXIDE REACTIONS. Preprint, American Inst. of Chemical Engineers, New York, 26p., 1975. 32 refs. (Presented at the American Institute of Chemical Engineers, National Meeting, 79th, Houston, Tex., March 1975.)

A 26-step mechanism of photochemical smog formation with sulfur dioxide present is described. Adjustable stoichiometric coefficients which can be chosen according to the particular hydrocarbon and initial reactant ratios add to the flexibility of the model. The mathematical equations in the model are solved numerically, and the model is validated using published experimental smog chamber data on the 1-butene-nitrogen oxide-sulfur dioxide-air system. A comparison of the model results with experimental data for the peak nitrogen dioxide and ozone concentrations and the time of maximum concentration for various initial reactant conditions reveals good agreement between the two sets of data. With a slight modification to the model, the effect of a mixture of hydrocarbons can be studied by introducing parallel reactions. (Author abstract modified)

51774

APTIC NO. 74079

Shiba, Tadao

CATALYST FOR PRODUCTION OF LOW SULFUR HEAVY OIL. (Tei iou juyū seizoyō shokubai). Text in Japanese. *Sekiyū to Sekiyū Kagaku (Petrol. Petrochem.)*, 19(3):57-60, March 1975.

The metal content (vanadium plus nickel) of crude oil ranges from 0.3 ppm for Arabian light oil VGO to 580 ppm for Iranian Heavy oil VTB. The catalytic life of fixed bed processes for direct desulfurization is considerably shortened when the V + Ni content of the crude oil exceeds 150 ppm. The catalytic activity of catalyst with very fine pores is high in the initial period but decreases significantly after metal and carbon deposit on the catalyst and cover the pores. Commercially available catalysts for the desulfurization of residual oil usually have larger pore size than those for the distillates. The catalysts for residual oil desulfurization is capable of treating 10-25 bbl/lb of catalyst and the reactor is usually designed for 6-11 mo operation at a liquid space velocity of 1/hr. Removal of waste catalyst from a reactor has been a problem for fixed bed processes as is the regeneration of the catalyst from moving bed processes.

51775

APTIC NO. 73988

Slinn, W. G. N.

ANALYTICAL INVESTIGATIONS OF INERTIAL DEPOSITION OF SMALL AEROSOL PARTICLES FROM LAMINAR FLOWS INTO LARGE OBSTACLES. PART C - POWER SERIES EXPANSIONS AND THE CRITICAL STOKES NUMBERS. In: *Pacific Northwest Laboratory Annual Report for 1974 to the USAEC Division of Biomedical and Environmental Research. Part 3: Atmospheric Sciences. Battelle Memorial Inst., Richland, Wash., Pacific Northwest Labs., Rept. UC-11, p. 150-158, Feb. 1975. 13 refs.*

NTIS: BNWL-1950 PT3

Power series solutions to the particle momentum equation are examined in relation to inertial deposition of small aerosol particles from laminar flows onto large obstacles. The method yields Taylor's values for potential flows and suggests that a critical Stokes number for Stokes flow about a sphere does not exist. Power series methods possess limited value because of the multivalued nature of the solution at large Stokes numbers. Empirical expressions for the critical Stokes numbers obtained from numerical analyses are used in a semi-empirical expression for the inertial impaction collision efficiency for flow about a sphere. (Author abstract modified)

51776

APTIC NO. 73989

Slinn, W. G. N.

ANALYTICAL INVESTIGATIONS OF INERTIAL DEPOSITION OF SMALL AEROSOL PARTICLES FROM LAMINAR FLOWS ONTO LARGE OBSTACLES. PART D - APPROXIMATE UPPER BOUNDS FOR THE COLLISION EFFICIENCIES AT SMALL STOKES NUMBERS. In: *Pacific Northwest Laboratory Annual Report for 1974 to the USAEC Division of Biomedical and Environmental Research. Part 3: Atmospheric Sciences. Battelle Memorial Inst., Richland, Wash., Pacific Northwest Labs., Rept. UC-11, p. 159-168, Feb. 1975. 8 refs.*

NTIS: BNWL-1950 PT3

A general implicit solution for the particle momentum equation that is valid to first order in Stokes number and leads to graphical representations of the particle velocity fields is presented. The Oseen uniformization technique is applied and approximated to yield solutions for the collision efficiencies at small Stokes numbers for potential flow about a sphere and a cylinder and for Stokes and Oseen flows about a sphere. An analytical continuation for an approximation to the collision efficiency for the case of potential flow about a sphere is presented and compared with numerical results. (Author abstract modified)

51777

APTIC NO. 73851

Smith, Peter P. and Leonard D. Spicer

CHARACTERIZATION OF PRODUCTS FROM THE PHOTOCHEMICALLY INDUCED REACTIONS BETWEEN SO₂ AND ALIPHATIC HYDROCARBONS. Preprint, Utah Univ., Salt Lake City, Dept. of Chemistry, 6p., 1975 (?). 8 refs.

Gas chromatography and mass spectrometry were used to characterize the photochemical reaction products generated by mixing sulfur dioxide with the aliphatic hydrocarbons ethane, propane, or normal-butane. The reactions were performed in a laboratory reactor with a 1000 watt mercury-xenon arc lamp backed by a parabolic mirror. The product mixture was a malodorous, acidic, pale-yellow oily substance (water insoluble) consisting of various sulfides, acetic acid, and acetaldehyde. The formation of polysulfides suggested that a chain reaction occurred.

51778

APTIC NO. 73882

Suzuki, Shin, Nobutoshi Hori, Hiroo Takagi, and Wataru Ando

PHOTOCHEMICAL REACTION OF SULFUR DIOXIDE AND ORGANIC COMPOUNDS, PART 7. (Aryusan gasu to yuki kagobutsu tonō kokagaku hannon, 7). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 782, 1975. (Presented at the Japan Chemical Society Spring Term Annual Meeting, 32nd, Tokyo, Japan, April 1-4, 1975, Paper 1034.)

A Pyrex reaction cell filled with sulfur dioxide, oxygen, and cis-2-butene or 1-butene was irradiated by a mercury lamp after the cell pressure was adjusted to 1 atm with helium gas. The cell was kept at water temperature during the ultraviolet irradiation. The photochemical reaction products were reacted with 2,4-dinitrophenylhydrazine in 2N hydrochloric acid solution, and the reacted aldehydes were extracted by carbon tetrachloride and analyzed by gas chromatography. The initial amount of oxygen in the cell affected the production of acetaldehyde. In the reaction of cis-2-butene, when the reaction conditions were kept constant except for the amount of oxygen in the cell, the acetaldehyde production was in the ratio of 5:2:1 for the initial oxygen contents in the ratio of 20:5:1 respectively. The reaction mechanism was that the UV light excited the SO₂ molecules to the excited singlet and triplet states, then the excited SO₂ molecules transferred their energy to oxygen forming an excited singlet oxygen which reacted with butenes to form peroxides which then decomposed to aldehydes. The formation of aldehydes with carbon number more than four was also observed in the reactions of cis-2-butene and 1-butene.

51779

APTIC NO. 74219

Tanba, K., M. Minami, and Y. Murakami

NO ADSORPTION RADICAL ON THE METAL OXIDES. (Kinzoku sankabutsu jo no NO kyuchaku rajikaru). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 500, 1975. 2 refs. (Presented at the Japan Chemical Society Spring Term Annual Meeting, 32nd, Tokyo, Japan, April 1-4, 1975, Paper 3K47.)

The adsorption of nitric oxide on tin oxide, titanium oxide and zirconium oxide was studied with electron spin resonance. The catalysts were fired at 250 C for 30 min and degased at 0.001 torr for 1 hr at a given temperature before use. Nitric oxide was supplied at 50 torr, and the adsorption was allowed to occur for 30 min. The electron spin resonance was measured at -196 C. The adsorbed NO radicals increased with increasing degasing temperature from 250 to 700 C. Adsorption of NO on ZnO gave virtually the same ESR signals as that on SnO₂. The signal of titanium(III) was observed when TiO₂ was degased. No signal was detected for NO adsorption on Ti(III).

51780

APTIC NO. 74161

Tezuka, Masahiro and Koji Kobayashi

REDUCTIVE REACTION OF NITRIC OXIDE BY HYDROGEN ON SILVER CATALYST. (*Gin shokubaijo deno sanko chisso no suiso ni yoru kangen hanna*). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 497, 1975. (Presented at the Japan Chemical Society Spring Term Annual Meeting, 32nd, Tokyo, Japan, April 1-4, 1975, Paper 3K44.)

The reaction of nitric oxide and hydrogen on a silver catalyst was carried out to study the effects of pressure variation, hydrogen pressure, and temperature. The reaction was conducted at 150-200 C with 10 g silver (99.9%), using closed circulation equipment with a dry ice-alcohol trap before and after the reactor. At high pressure in the initial reaction stage, the rates of formation of nitrous oxide and nitrogen oxides increased significantly. The rate of formation reached a constant value and leveled off as the pressure decreased. The rates of N₂O and NO_x formation became pressure-independent and approached zero as the reaction temperature reached 230 C.

51781

APTIC NO. 73784

Tsuchiya, Junichi, Takeyoshi Haijima, Hiromichi Arai, and Hiroo Tominaga

OXIDATION REACTION OF NITRIC OXIDE BY TRANSITION METALS LOADED ON ZEOLITE 13X AND 13Y. (*Seni kinzoku tanji zeoraito 13X, Y shokubai ni yoru issanka chisso no sanko hanna*). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 501, 1975. (Presented at the Japan Chemical Society Spring Term Annual Meeting, 32nd, Tokyo, Japan, April 1-4, 1975, Paper 3K48.)

The catalytic activities for nitric oxide oxidation reaction by transition metals in low oxidation states are compared at different reaction temperatures. Each metal catalyst is loaded on Zeolite 13X or 13Y using metal chloride solutions which are placed in a reaction apparatus and the NO gas with initial concentration at 100 ppm and 300 ppm is flown through the catalyst bed. Both NO and nitrogen oxides concentrations are determined by a chemiluminescence technique. The catalytic activity found was in the order copper (I) is equal to Cu (II) is greater than chromium (III) is greater than cobalt (II) is greater than iron (II) is greater than nickel (II) is equal to manganese (II) and Fe (III) when metals are loaded on the Zeolite 13Y. The NO conversion by Cu (II) on Zeolite 13Y was highest at a reaction temperature of 350 C, and it was 44% and 31.1% for initial NO concentration of 100 ppm and 300 ppm respectively. The corresponding conversions were 32.3% and 32.0% at 450 C and 2.1% and 1.6% at 250 C, respectively. There was no difference in Cu (II) activity regardless the type of Zeolite at a reaction temperature of 450 C, however the Y type Zeolite was more efficient than the X type Zeolite to induce the Cu (II) catalytic activity at lower reaction temperatures. The catalytic activity of Cu (II) on Zeolite 13Y was two times greater than that of Cu (II) on Zeolite 13X at 350 C, and it was three times greater at 300 C.

1974

51782

APTIC NO. 73855

Babenko, V. A., A. P. Prishivalko, and S. T. Leyko

LIGHT SCATTER BY RADially INHOMOGENEOUS PARTICLES OF ATMOSPHERIC AEROSOL. (*Rasseyanie sveta radial no neodnorodnymi chastitsami atmosfornogo aerizolya*). Text in Russian. Dokl. Akad. Nauk. Beloruss SSR, 18(11):984-987, 1974. 7 refs.

Light scattering by radially inhomogeneous atmospheric aerosol particles, occurring temporarily during the condensation of water vapor on hygroscopic or partly or fully water-soluble aerosol particles, an important phenomenon for the correct interpretation of laser measurements of air pollutants, was modeled by spherical particles whose refractive index

changes from the center to the periphery according to a definite law. Calculations of the angular and integral characteristics of light scattering by radially inhomogeneous particles are presented, assuming that the refractive index varies from 1.5 as determined for dry aerosol to 1.33 for water on the surface of the particle. The effect of inhomogeneity increased with the increasing difference between the values of the refractive indices in the center and on the boundary of the particles.

51783

APTIC NO. 73686

Buechtemann, W.

DEPOLARIZATION OF LASER RAYS IN FORWARD AND BACKWARD SCATTERING IN THE ATMOSPHERE. (*Depolarisation von Laserstrahlung bei Vorwaerts- und Rueckwaertsstreuung in der Atmosphaere*). Text in German. Landesanstalt fuer Immissions- und Bodennutzungsschutz des Landes Nordrhein-Westfalen, Essen (Germany). Laser-Tag. Stand Anwendungstech. Lasern Geb. Luftreinhaltung, Essen, Germany, 1974, p. 94-97, 1 ref. (Oct.)

The depolarization of laser rays in forward and backward scattering was studied by monostatic polarization lidar. Depolarization during measurements with monostatic lidar can be due to multiple scattering and to the non-radial symmetric structure of the scattering particles. The polarization properties, e.g., the degree of depolarization or ellipticity and rotation of the axes, can give additional information on the nature and size distribution of the scattering particles. Actual measurements revealed considerable variations in the depolarization due to asymmetry of the scattering aerosol particles. The backward depolarization was about 50 times higher than the forward depolarization during rainfall; while the degree of backward depolarization was about the same as without rain, and the degree of forward depolarization was considerably higher during rain. The depolarization was highest during snowfall.

51784

APTIC NO. 74059

Contour, J.-P.

CATALYTIC ACTION OF SOLID PARTICLES ON CHEMICAL REACTIONS BETWEEN AIR POLLUTANTS. (*Action catalytique de particules solides sur les reactions chimiques se produisant entre polluants atmospheriques*). Text in French. Pollut. Atmos. (Paris), no. 64:436-443, Oct.-Dec. 1974. 45 refs.

Studies on chemical reactions between solid particulates and gaseous air pollutants, and between air pollutants under the catalytic effect of solid particles, mainly metal oxides, are reviewed. Solid particles may catalyze chemical reactions between air pollutants leading to secondary air pollutants; such as the oxidation of carbon monoxide and nitric oxide, olefins, sulfur dioxide, and photodegradation of nitrogen dioxide. Ferric oxide catalyzes the oxidation of SO₂. Vanadium pentoxide emitted by power plants decomposes nitrogen oxides in the flue gas plume. On the other hand, solid particles absorb gaseous ones, which are then capable of penetrating into the deep respiratory organs in concentrations far exceeding those measured in the atmosphere.

51785

APTIC NO. 73946

Fish, Birney R.

AEROSOL PHYSICS OF ASBESTOS FIBERS: INTERCEPTION. Atomic Energy Commission, Oak Ridge, Tenn., Oak Ridge National Lab., Contract W-7405-eng-26, 17p., July 1974. 11 refs.

NTIS: ORNL-TM-4051

A theoretical analysis of asbestos deposition by geometrical interception of elongated fibers is presented. Deposition, or penetration, is strongly affected by fiber orientation. No fibers oriented perpendicularly to the flow direction can penetrate a hollow circular cylinder having a diameter (D) smaller than the

fiber length (L). For the case of randomly oriented fibers where L is equal to D, the estimated fraction penetrating is nearly 30% and is approximately 27 (D/L)% for L greater than 3D. The penetration for fibers with a cosine distribution of position angle relative to the flow direction is an estimated 42.4 (D/L)% for fiber lengths greater than or equal to the cylinder diameter. Asbestos fibers as long as 200 micron, found in the alveoli of the lungs, thus having a finite probability of penetrating respiratory airways that are of the same order of diameter as the length of the fiber. Penetration is expected to be greater for a single fiber than for a spherical aggregate having a diameter the same as the fiber length. (Author abstract modified)

51786

APTIC NO. 68197

Hadeishi, Tetsuo

ISOTOPE SHIFT ZEEMAN TECHNIQUE FOR DETECTION OF ATOMS AND MOLECULES. Preprint, California Univ., Berkeley, Lawrence Radiation Lab., 15p., 1974 (?). 3 refs.

The use of isotope shift Zeeman effect atomic absorption spectrometry (IZAA) for the detection of atoms and molecules in various plant and animal materials is described. The technique is capable of detection of atomic elements directly from the host material without prior chemical treatment, with typical measurement times ranging from 15-60 sec. The IZAA technique in its present form is capable of detecting mercury, lead, cadmium, and arsenic atoms as well as sulfur dioxide, carbon monoxide, and carbon dioxide molecules. The capability of the instrument is illustrated for the detection of mercury in human hair, urine, soil, and fish meat; comparisons between the IZAA method and other conventional methods are also presented for mercury analyses of such materials and show the matrix independence of the IZAA method.

51787

APTIC NO. 73692

Hochenbleicher, J. G., W. Kloeckner, and H. W. Schroetter

MEASURING THE RAMAN SCATTERING CROSS SECTION IN GASES. (Messung von Raman-Streuquerschnitten an Gasen). Text in German. Landesanstalt fuer Immissions- und Bodennutzungsschutz des Landes Nordrhein-Westfalen, Essen (Germany). Laser-Tag, Stand Anwendungstech. Lasern Geb. Luftreinhaltung, Essen, Germany, 1974, p. 191-204. 8 refs. (Oct.)

The Raman scattering cross sections of sulfur dioxide, hydrogen sulfide, ammonia, and benzene vapor were measured by argon ion laser excitation, and compared with other measurement data. These measurements serve as a basis for the application of the Raman effect to the measurement of gaseous air pollutant concentrations, analysis of combustion products in flames, and for temperature measurement in hot gases. The discrepancies between the measured values and literature data, as observed in certain cases, require further study.

51788

APTIC NO. 73861

Jellinek, H. H. G.

POLYMER-GAS (AIR POLLUTANTS) REACTIONS. In: Recycling and Disposal of Solid Wastes - Industrial, Agricultural, Domestic. T. F. Yen (ed.), 1974, p. 185-217. 26 refs.

Polymer-gas reactions involving such air pollutants as sulfur dioxide, nitrogen dioxide, and ozone were investigated. Vinyl polymers were scarcely affected by SO₂ and NO₂ at concentrations usually present in polluted atmospheres. However, at larger concentrations, these polymers were oxidized, leading to chain scission and/or cross-linking. Polymers such as polyethylene and polypropylene were susceptible to NO₂ due to unsaturation in their molecules, usually leading to cross-linking. The addition of ultraviolet radiation frequently enhanced the degradation process and led, in conjunction with oxygen, to a synergistic action. Reaction with SO₂ led to the

formation of sulfinic acid groups on polymer chains which played a role in chain scission similar to that played by hydroperoxide groups in ordinary oxidation reactions. Elastomers were almost as susceptible to NO₂ and often to SO₂ as they were to ozone, with main chain scission or cross-linking eventually occurring. Polymer molecules such as linear polyurethanes were also susceptible to NO₂, leading to simultaneous chain scission and cross-linking. Chain scission of the polyamide, Nylon-66, during NO₂ exposure was very sensitive to polymer morphology and percentage crystallinity as well as to crystallite size and its distribution. Generally, the effect of the air pollutants on polymers was minimized by avoiding any reactive hydrogen atoms and unsaturation in the polymer chains. (Author conclusions modified)

51789

APTIC NO. 74135

Knoche, K. F., H. Roertgen, F. Mueller, and H. J. Fissan

FLOW AND REACTION PROCESSES IN MODEL FLAMES. (Stoemungs- und Reaktionsvorgaenge in Modellflammen). Text in German. Waerme, 80(1,2):6-9, April 1974. 18 refs.

The nitric oxide formation in an acetylene-air laminar flame was measured over a temperature range of 1500-2500 K. Model calculations of a turbulent hydrogen-air turbulent flame revealed the impossibility of satisfactorily describing the complex reaction processes and of evaluating pollution formation processes in flames without considering the chemical non-equilibrium of the flame. The measurement of the temperature and the NO distribution of a symmetrical acetylene-air flame revealed a nearly cylindrical-symmetrical distribution profile for NO concentrations. The rates of NO formation in the flame boundary zone and at 30 to 70 mm distance from the burner opening at 1500 K were calculated to be 10-60 ppm/milli sec, suggesting a diffusive transport of radicals within the flame due to inhomogeneities. The rate of NO formation is substantially lower according to the Zeldovich mechanism of NO formation.

51790

APTIC NO. 73827

Komissarov, V. D. and A. Y. Gerchikov

KINETIC STUDY OF THE LIQUID-PHASE OXIDATION OF ORGANIC COMPOUNDS BY OZONE. (Izucheniye kinetiki zhidkofaznogo okisleniya organicheskikh soedineniy ozonom). Text in Russian. Kinetika i Kataliz, 15(4):916-921, 1974. 14 refs.

The kinetics of the liquid-phase oxidation of organic compounds, such as methylethylketone and ethylbenzene, in carbon tetrachloride by ozone was studied in a bubbler type reactor. The high reactivity of ozone led to the diffusion of ozone from the gas-liquid interface into the solution, and to the formation of an ozone gradient. As a result, the reaction rate constant was determined to be higher when ozone was bubbled through the solution than it was under static conditions. The bubbling method is unsuitable for the determination of the reaction rate constant of the ozone-hydrocarbon reaction.

51791

APTIC NO. 74055

Livinov, A. T.

DIMENSIONING OF GRAVITY SEPARATORS AND CALCULATION OF THEIR EFFICIENCY. (Raschet razmerov gravitatsionnykh apparatov i effektivnosti pyleulavlivaniya). Text in Russian. Zh. Prikl. Khim., 47(8):1779-1782, Aug. 1974. 1 ref.

A method for the computation of the optimal length of dust settling chambers and of the separation efficiency of such chambers is presented. Unlike the preexisting method which ignores the inertia travel of the dust particles, the new method taking this phenomenon into account yields a greater chamber length, and is in agreement with experimental findings. The acceleration path over which the particle assumes its sedimentation velocity is negligible.

51792

APTIC NO. 74183

Madelaine, G. and A. Renoux

THE NATURE AND MEASUREMENT OF ATMOSPHERIC AEROSOL. (*L aerosol atmosferique. Sa nature et sa mesure*). Text in French. *Pollut. Atmos. (Paris)*, no. 64:389-397, Oct.-Dec. 1974. 4 refs.

The origin, nature, and measurement of atmospheric aerosol are reviewed with special reference to the lower troposphere. Natural aerosols are formed from soil and rocks, from sea salts, volcanic activity, hydrocarbons of plant origin, and from reactions of gases, such as hydrogen sulfide, oxides of nitrogen, and ammonia. Anthropogenic aerosols originate from direct particulate emissions, particles formed by gaseous-phase reactions of sulfur dioxide and nitrogen oxides, and from hydrocarbons. The background aerosol to be found in non-polluted areas has a concentration of about 700/cu cm, and the particle size is usually greater than 0.1 micron. Oceanic aerosol has a concentration of less than 10 particles/cu cm, and is in a concentration range of 0.5-20 micron. Continental aerosol in polluted areas has a concentration maximum around 0.03 micron and below 0.01 micron. The concentration ranges from 1000 to 100,000/cu cm. Photoelectric instruments, such as aerosol spectrometers and condensation nuclei counters are most important in aerosol studies, their lower detection limit having been lowered to 0.06 micron. Microscopy, especially electron microscopy is rather sophisticated for aerosol investigations. Electrostatic precipitators are most promising in this area.

51793

APTIC NO. 74235

Penzhorn, R. D., W. G. Filby, K. Guenther, and L. Stieglitz

PHOTOCHEMICAL REACTIONS OF SULFUR DIOXIDE WITH ALIPHATIC HYDROCARBONS. (*Die photochemischen Reaktionen des Schwefeldioxyds mit aliphatischen Kohlenwasserstoffen*). Text in German. In: *Chemische Reaktionen atmosphärischer Schadstoffe. Kernforschungszentrum Karlsruhe (West Germany), Inst. fuer Radiochemie, Rept. KFK 1975 UF, p. 16-36, May 1974. 26 refs.*

The reaction of the excited triplet state of sulfur dioxide with various aliphatic hydrocarbons was studied. Aerosol products containing thioesters, isomeric sulfinic and sulfonic acids, disulfides, sulfones, and disulfones, as well as sulfonic acid thioesters were formed during the photochemical reactions of SO₂ with aliphatic hydrocarbons. The products resulted from a series of competing radical reactions, the primary step of which was a hydrogen abstraction from the hydrocarbon via triplet SO₂, followed by the formation of the alkyl sulfonyl radical. Reactions of such radicals may play a role in the homogeneous removal of SO₂ in the lower atmosphere and in the formation of aerosols. In the presence of oxygen, the main products of the reaction of triplet SO₂ with butane were sulfuric acid, isomeric sulfonic acids, butanone, and monobutyl-sulfate. Nitric oxide was approximately 550 times more efficient in quenching this reaction than oxygen.

51794

APTIC NO. 74236

Penzhorn, R. D. and W. Schoeck

FORMATION OF AEROSOLS BY LIGHT INDUCED REACTIONS OF ATMOSPHERIC CONTAMINANTS IN LABORATORY AIR. (*Aerosolbildung durch lichtinduzierte Reaktionen atmosphärischer Schadstoffe in Luft*). Text in German. In: *Chemische Reaktionen atmosphärischer Schadstoffe. Kernforschungszentrum Karlsruhe (West Germany), Inst. fuer Radiochemie, Rept. KFK 1975 UF, p. 37-51, May 1974. 18 refs.*

The kinetics of the photochemical aerosol formation of the sulfur dioxide-kinetic oxide cis-butene-2-air system was studied at various partial pressures of the reagents. It was clearly possible to distinguish between processes of condensation and growth and those of removal by reducing the irradiation intensity. The particle concentration and size distribution reached a

steady state after a certain period of irradiation. The steady state depended on the type of reagent mainly and very little on the absolute pressure of the reagent. The composition of the aerosol was mainly sulfuric acid, although some photooxidation products of the butene were also found.

51795

APTIC NO. 74057

Petroll, Joachim

A MATHEMATICAL STATISTICAL STUDY OF THE GRAIN SIZE DISTRIBUTION. (*Einige mathematisch-statistische Betrachtungen ueber Korngrößenverteilungen*). Text in German. *Staub, Reinhaltung Luft*, 34(12):445-451, 1974. 7 refs.

The Gates-Gaudin-Schuhmann distribution, the Rosin-Rammler-Sperling distribution, the logarithmic Gauss distribution, and the simple Gauss distribution are the most frequently used distributions in dust statistics. These reliable distribution factors are put on a common basis and generalized. As a result of this, further statistical distribution functions for the description of particle size distribution are prepared and the possibilities of comparing different types of functions are shown.

51796

APTIC NO. 74017

Schurath, U., K. H. Becker, R. D. Penzhorn, and H. Guenten

RATE CONSTANTS FOR THE DEACTIVATION OF SINGLET MOLECULAR OXYGEN BY NATURAL ATMOSPHERIC CONSTITUENTS AND ATMOSPHERIC POLLUTANTS. (*Geschwindigkeitskonstanten fuer die Desaktivierung des elektronisch angeregten Sauerstoffs durch Atmosphären-Komponenten und atmosphärische Schadstoffe*). Text in German. In: *Chemisch Reaktionen atmosphärischer Schadstoffe. Kernforschungszentrum Karlsruhe (West Germany), Inst. fuer Radiochemie, Rept. KFK 1975 UF, p. 52-64, May 1974. 20 refs.*

Room temperature rate constants for the deactivation of electronically excited molecular oxygen by primary and secondary atmospheric pollutants (sulfur dioxide, hydrogen sulfide, methyl mercaptan, formaldehyde, and acetone) were measured in a 220 cu m low pressure reactor under static conditions. The values were compared with rate constants for the deactivation of electronically excited molecular oxygen by normal atmospheric components and were comparable, thus suggesting that electronically excited oxygen does not contribute significantly to the atmospheric smog produced by these pollutants.

51797

APTIC NO. 73869

Tornabene, T. G., S. L. Peterson, and H. W. Edwards

EFFECTS OF LEAD ON BACTERIA. In: *Environmental Contamination Caused by Lead (Interim Report)*. Colorado State Univ., Fort Collins, National Science Foundation Grants GT-34813X1 and GI-44423, p. 324-331, Dec. 31, 1974. 10 refs.

Exposure of *Micrococcus luteus* cells to lead for 20 consecutive days resulted in osmotically sensitive cells that lost their brilliant yellow pigmentation. Electron microscopic studies of the cellular subfractions revealed the occurrence of lead-containing aggregates in the membranes of the cells. Acellular studies with lipid-impregnated disks in contact with lead-containing solutions demonstrated that lead interacts strongly only with the complex lipid mixture that is characteristic of the cell membrane and not with any specific lipid component. *Micrococcus luteus* cells cultivated in media containing lead salts exhibited a sequence of changes in the quantity of total cellular lipids with essentially no changes from normal cellular yields. The lipid composition of cells cultivated one to four times was moderately decreased, and that of cells cultivated five to seven times was reduced by as much as 50%. Cells cultivated more than seven times in lead-containing media showed progressively greater quantities of lipid approaching those found in control cells. Lead appeared to be affecting a common biochemical parameter in the biosynthesis of lipids.

1973

51798

APTIC NO. 74233

Amirnazmi, Ali

OXYGEN INHIBITION IN THE DECOMPOSITION OF NO ON METAL OXIDES AND PLATINUM. Stanford Univ., Palo Alto, Calif., Dept. of Chemical Engineering, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., order no. 74-13,596, 1973, 266p. 76 refs.

Oxygen inhibition of the rate of nitric oxide decomposition was studied in a differential flow reactor using catalysts composed of oxides of iron, cobalt, nickel, copper, and zirconium as well as supported and unsupported platinum at pressures of 760-1530 torr and temperatures of 120-150 C. The reaction for all catalysts was first order with respect to NO, and O₂ showed a strong inhibiting effect. The decomposition rates on oxides extrapolated to zero concentration of O₂ were generally higher than those previously reported, suggesting the direct chemical reaction of NO with these oxygen deficient oxides. Studies of NO decomposition on catalysts under non-stationary conditions indicated a deficiency of O₂ in the gas phase, and re-oxidation of the catalysts by NO resulted in an additional disappearance of NO. Thus, the discrepancy was ascribed to non-stationary behavior of oxide catalysts. The rate of NO decomposition on Pt was at least two orders of magnitude higher than on oxides under the same conditions. The reduced surface of Pt appeared to rearrange slowly to a less active oxidized form by treatment in an oxidizing atmosphere at high temperatures. Nitrous oxide was observed as a product at low temperatures during the oxidation of the reduced surfaces of cobalt oxide, iron oxide, copper oxide and supported Pt with NO as well as during the decomposition of NO on cobalt oxide and supported Pt under stationary-state conditions. Nitrous oxide appeared to be an intermediate in the NO decomposition. The improvement of catalysts for NO decomposition appears to require an increased surface concentration of active sites capable of adsorbing NO and being poisoned by O₂. (Author summary modified)

51799

APTIC NO. 73948

Askne, Christer

METHOD OF DETERMINING STRONG ACID IN PRECIPITATION BASED ON COULOMETRIC TITRATION WITH APPLICATION OF GRAN'S PLOT. Swedish Water and Air Pollution Research Lab., Gothenburg, Rept. B 152, 53p., March 1973, 9 refs.

A coulometric method for determining sulfuric acid in precipitation is described. The procedure combines a coulometric titration with a function generator that is used for evaluating the Gran function. The entire system is an integrated electronics package. The hydrogen ion concentration of the precipitation must be between 0.0001 and 0.001 molar. The standard deviation for 10 titrations is about 2.5%. The concentration of acid is obtained from a material balance equation, with the starting and end points of the titration being detected as characteristic pulses that correspond to coulometer on and off conditions. (Author abstract modified)

51800

APTIC NO. 74023

Jayanty, R. K. M., R. Simonaitis, and Julian Hecklen

THE INHIBITION OF PHOTOCHEMICAL SMOG III. INHIBITION BY DIETHYLHYDROXYLAMINE, N-METHYLANILINE, TRIETHYLAMINE, DIETHYLAMINE, ETHYLAMINE, AND AMMONIA. Pennsylvania State Univ., University Park, Dept. of Chemistry, Center for Air Environment Studies, Rept. 339-73, 18p., Oct. 1973, 6 refs.

Potential photochemical smog inhibitors were tested at 25 C by monitoring the conversion of nitric oxide to nitrogen dioxide for irradiated mixtures of propylene, nitric oxide, and oxygen in the presence and absence of the inhibitor. The NO₂ pressure was reduced to one-half its value in the absence of inhibi-

tor following the addition of 1.5 mtorr N-methylaniline, 2.5 mtorr diethylhydroxylamine, 6 mtorr triethylamine, or 6.0 mtorr diethylamine. Ammonia showed no inhibition, and ethylamine showed only slight inhibition. The presence of either 8.1 mtorr triethylamine, 6.0 mtorr diethylamine, 2.2 mtorr diethylhydroxylamine, or 2.4 mtorr N-methylaniline resulted in a shift of the times for maximum percent conversion of NO to NO₂ of from 12 min (additive absent) to 15, 18, 22, and 22 min, respectively. (Author abstract modified)

51801

APTIC NO. 74261

Pourprix, Michel

A NEW ELECTROSTATIC PRECIPITATOR. APPLICATIONS TO THE STUDY OF AEROSOL CHARGE BY DIFFUSION OF BIPOLAR IONS. (Un nouveau precipitateur electrostatique. Applications a l'etude de la charge des aerosols par diffusion d'ions bipolaires). Text in French. Paris Univ. (France), Thesis (Ph.D.), Paris, July 2, 1973, 88p. 33 refs. (Report No. CEA-R-4553, Centre d'Etudes Nucleaires de Fontenay-aux-Roses, Departement de Protection, Fontenay-aux-Roses, France.)

A new miniaturized electrostatic precipitator for the study of aerosol charge processes, and especially of aerosol charge by diffusion of bipolar ions is described along with results of aerosol charge studies. The precipitator is composed of an adjustable aerosol injector and a parallel canal enclosed between the plates of a plane condenser to which positive and negative voltage is applied. The precipitator is suitable for the analysis of the electric motility of aerosol particles ranging from 0.01 to 1 micron in size. Its resolution is relatively good in the order of magnitude of 5%. Experimental studies performed with this precipitator on monodisperse aerosol demonstrated that it is rather difficult to achieve the state of charge of particles of Boltzmann's equilibrium in most aerosol neutralization experiments. The ionization intensity is far from being negligible, and Boltzmann's equilibrium is not verified in the immediate vicinity and inside a permanently and bipolarly ionized medium. Inside the medium, the state of charge of the particles corresponds to a stationary equilibrium where the charge acquired by the particles is strongly positive. The charge that can be conferred on the particles by the bipolar method is in the same order of magnitude as that which can be achieved by classical charging.

51802

APTIC NO. 73665

Saltzman, Bernard E.

PREPARATION OF KNOWN CONCENTRATIONS OF AIR CONTAMINANTS. In: *The Industrial Environment - Its Evaluation and Control*. Washington, D. C., Government Printing Office, 1973, Chapt. 12, p. 123-137. 24 refs. GPO

The preparation of known concentrations of air contaminants for calibrating air monitoring instruments is reviewed. Two general types of systems are used for generating known concentrations of a compound: batch mixtures and flow dilution systems. The latter possesses the advantage of being capable of providing theoretically unlimited volumes at known low concentrations which can be rapidly changed if desired. A flow dilution system requires a metered source of diluent air and a source for supplying known amounts of gases, vapors, or aerosols; the flows are combined in a mixing device. Source devices for gases and vapors include vapor pressure systems, motor driven syringes, diffusion systems, porous plugs, and permeation tubes. Source devices for aerosols include: dry dust feeders, nebulizers, vaporization and condensation systems, and spinning disc aerosol generators.

51803

APTIC NO. 73852

Tesner, P. A.

FORMATION OF SOOT PARTICLES. *Faraday Symp. Chem. Soc.*, vol. 7: 104-108, 1973, 15 refs.

EFFECTS-HUMAN HEALTH

Probable mechanisms of the formation of pyrolytic carbon films and soot particles are discussed based on formation rate data. Both are two-stage processes which include nucleation and nuclei growth. The formation of pyrolytic carbon from ethane at temperatures below 1300 K is a molecular process. The activation energies for the formation of plane nuclei and their subsequent growth are 80 and 50 kcal/mol, respectively. The formation of soot particles is limited by the nucleation, with the nuclei being either complex unsaturated polymer molecules or simple radicals. The properties of the primary nucleus define the process in terms of further growth and the nature of the soot particles produced. (Author abstract modified)

1971

51804

APTIC NO. 74259

Friedrich, F. D., E. R. Mitchell, G. K. Lee, and H. Whaley
THE CCRL TUNNEL FURNACE DESIGN AND APPLICATION. *International Flame Research Foundation, Int. Flame Res. Found., 2nd Members Conf., Ijmuiden, Holland, 1971, p. XV.1 - XV.18. 17 refs. (May 13-14.)*

A liquid-cooled tunnel furnace (1 m diameter and 4.25 m length) designed for the study of combustion aerodynamics and the formation of such pollutants as carbon monoxide, sulfur oxides, nitrogen oxides, hydrocarbons, and particulates is described. The test furnace is designed to burn pulverized coal, oil, or gas at an input rate of 2 million Btu/hr. The unit is constructed as a series of calorimeters, making it possible to measure the heat absorbed by each 6 in. increment of furnace length. A full-length slot with a series of water-cooled doors permits probing even when the furnace is under pressure. The first project planned for the new furnace is an investigation of the factors affecting the formation of nitrogen oxides in oil flames. (Author summary modified)

1969

51805

APTIC NO. 74223

Matteson, Michael J., Werner Stoeber, and Horst Luther
KINETICS OF THE OXIDATION OF SULFUR DIOXIDE BY AEROSOLS OF MANGANESE SULFATE. *Ind. Eng. Chem. Fundamentals, 8(4):677-687, Nov. 1969. 18 refs.*

The kinetics of the oxidation of sulfur dioxide in aqueous aerosols of manganese sulfate under conditions which approach atmospheric were studied to obtain information on sulfuric acid mist formation in industrially polluted atmospheres. Although the rate-controlling mechanism appeared to lie within the liquid phase, the oxidation process appeared to be controlled by a four-step chemical reaction involving the formation of intermediate complexes. A determination of the rate constants for each intermediate reaction indicated that the assumed model adequately reproduces experimental data. Levels of acid mist ranging from 800 micrograms/cu m (after 1 hr) to 80,000 micrograms/cu m (after 1 wk) were predicted to occur in the presence of 1000 ppm SO₂ and 100 micrograms/cu m of MnSO₄ under conditions of stagnant air mass and a relative humidity exceeding 95%.

51806

APTIC NO. 75319

Richter, W.

LOG-LINEAR RULE - A SIMPLE METHOD FOR MEASURING FLOW VOLUMETRICALLY IN PIPELINES. (*Log-Linear-Regel - ein einfaches Verfahren zur Volumenstrommessung in Rohrleitungen*). *Heizung-Lueftung-Haustech., 20(11):407-409, Nov. 1969. 5 refs. Translated from German. Leo Kanner Associates, Redwood City, Calif., 14p., Feb. 1975.*

The use of the log-linear rule for volumetric measurement of gas flow in pipelines of circular cross section is discussed. The

method requires only three measurement points for each cross section radius. Total flow by volume is the product of duct cross section multiplied by the arithmetic mean of all flow velocities measured in the cross section. Application of the log-linear method to measurements for four different duct diameters reveals differences less than 0.2% relative to the conventional, considerably more expensive radius of gyration method. (Author abstract modified)

EFFECTS-HUMAN HEALTH

1975

51807

APTIC NO. 75188

Burchard, John K.

SIGNIFICANCE OF PARTICULATE EMISSIONS. *Environmental Protection Agency, Washington, D. C., Office of Research and Development, Symp. Electrostat. Precipitators Control Fine Part., Research Triangle Park, N. C., 1975, p. 5-12, EPA-650/2-75-016. 3 refs.*

NTIS: PB 240440/AS

The significance of controlling particulate emissions is discussed along with the role of electrostatic precipitators in reducing fine particulate emissions. Particulates are significant pollutants since they are capable of causing poor visibility, endangering health, and acting as transport vehicles for gaseous pollutants. Fine particulates are particularly significant in terms of their capability to enter the respiratory system and cause short term irritant effects or longer term damage such as pneumoconiosis. Tests with high efficiency electrostatic precipitators indicate that fractional efficiencies of better than 90% can be attained for particulates down to the 0.1 micron size range.

51808

APTIC NO. 73908

Fujisawa, H.

PHOTOCHEMICAL SMOG AND INJURIES OF SCHOOLCHILDREN DUE TO IT. FORECASTING OF AIR POLLUTION EPISODES BY THREE INDEX VALUE OF COMPOUND AIR POLLUTION. (*Kokagaku smog to gakudo higai ni taisuru teigen - Fukugo o sen shihyochi ni yoru chui yoho o*). Text in Japanese. *Mainichi (Life), 6(7):74-78, July 1975.*

In Tokyo, schoolchildren are confined indoors when the oxidant concentration becomes more than 0.15 ppm. Usually there is a coincidence between the frequency of complaints of subjective symptoms and the peak of oxidant concentration; however, there have been many cases when such a relationship did not occur, suggesting, the existence of compound pollution by which the frequency of complaints increases. A compound air pollution index, is discussed which is calculated by an index value are composed of concentrations of sulfur dioxide, nitrogen dioxide, carbon monoxide, floating dust, hydrocarbons, and oxidants. If such a normalized index of compound air pollution could be used for forecasting air pollution episodes, schoolchildren will be better able to request their activities.

51809

APTIC NO. 73917

Hashimoto, Y., I. Furuuchi, S. Ushijima, S. Shimada, Y. Iwai S. Baba, and N. Shimizu

CLINICAL INVESTIGATION OF AIRWAY DISEASES (AIR POLLUTION TYPE)- THE RELATIONSHIP BETWEEN THE RESULTS OF INTRACUTANEOUS REACTION TEST AND THE RESULTS OF CULTURING CANDIDAE. (*Kido shikkan (taikiosen-sei) ni taisuru rinsho teki kento. Hinai-hanno seiseki oyobi candida-zoku baiyo seiseki tono kankei ni tsuite*). Text in Japanese. *Nihon Jibi-Inkoka Gakkai Kaiho (Jap. J. Otorhinolaryngol. Soc.), 78(3):51, March 1975.*

Patients with airway diseases possibly induced by air pollution were tested by intracutaneous reactions. The results of intracutaneous tests with antigens such as candida and bronchoasthma were divided into instantaneous, intermediate, and delayed types and the relationship between positive cases and clinical symptoms was investigated. Identification of candida isolated from upper airway is reported, as well the immunological study of the patients sera.

51810

APTIC NO. 72370

Higashida, T., M. Hashimoto, H. Takasaka, and S. Nakahira
SURVEY ON ENVIRONMENTAL POLLUTION IN THE VICINITY OF THE SEN-POKU COASTAL INDUSTRIAL ZONE: HEALTH OF CHILDREN AND AIR POLLUTION. (*Senpoku rinkai konbinato kinsetsu chiiki ni okeru nogai ni kansuru chosa kenkyu - tokuni, taiki-osen to jido no kenko*). Text in Japanese. *Nippon Eiseigaku Zasshi* (Japan. J. Hyg.), 30(1):156, April 1975.

In Takaishi City located near the Sen-poku coastal industrial zone, the relationship between children's health and air pollution was surveyed for 4 years beginning in 1970. The ratio of children with a lower 1-second rate to all children coincided over time with concentrations of sulfur dioxide, nitrogen dioxide, and nitric oxide, possibly showing impaired ventilation of the lung. The morbidity of subjective symptoms such as sputum, cough, and sore throat was higher in the winter when the concentrations of SO₂, NO, and NO₂ were higher suggesting synergistic effects of pollution. One case of asthma was possibly due to air pollution.

51811

APTIC NO. 73914

Hirose, T.

EXAMINATION OF METHODS FOR DIAGNOSING CHRONIC OBSTRUCTIVE PULMONARY DISEASES - AN APPROACH TO PULMONARY DISEASES DUE TO AIR POLLUTION. (*Minsei heisokusei hai shikkan e no torikumi - osen ni yoru hai-shikkan en no approach*). Text in Japanese. *Min-I-Ren Iryo* (J. All-Jap. Leagues Democr. Med. Inst.), no.35:80, Feb. 1975.

Methods of diagnosing chronic obstructive pulmonary diseases in a prefectural medium-size general hospital are discussed. Moderate and serious cases were at first studied with emphasis on pulmonary emphysema. The second rate, flow volume, index of respiratory obstruction, and oxygen-content difference between alveolar air and arterial blood were effective for the diagnosis of pulmonary emphysema. Secondly, early and peripheral cases were analyzed with the criteria of a 1-second rate of more than 70% and abnormal flow-volume. Many cases were screened by this pattern.

51812

APTIC NO. 73781

Iwanami, Kazuo

REACTION BETWEEN ACETYLENEDICARBOXYLIC ESTER AND CERTAIN CARCINOGENIC SUBSTANCES AND THE DEACTIVATION POSSIBILITY SUGGESTED FROM ANIMAL EXPERIMENT STUDY. (*Arushu no hatsugun bushitsu to asechiren jikarubonsan esuteru tonno hanno narinobi dobutsu jikken ni yori shisa sareru shikkatsu no kanosei*). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 806, 1975. (Presented at the Japan Chemical Society, Spring Term Annual Meeting, 32nd, Tokyo, Japan, April 1-4, 1975, Paper 2012.)

Reactions of acetylenedicarboxylic acid methyl and ethyl esters with aromatic amines and benzo(a)pyrene were carried out in alcohol solution. The aromatic amines used for the study include alpha-naphthylamine, benzidine, 2-amino-1-naphthol, o-aminoazotoluene, and 4-methylaminoazobenzene. Acetylenedicarboxylic acid ester reacted with aromatic amines spontaneously. Spectrometric study of the products by infrared spectrometry and nuclear magnetic resonance suggested the formations of a 1:1 adduct for primary amines, a 1:2 adduct for secondary amines, and intramolecular chelate structures for the 1:1 adduct. Tritium-labelled benzo(a)pyrene gave a reaction product having a different R_f value than that of benzo(a)pyrene in paper chromatography. Animal tests showed that the mixture of acetylenedicarboxylic acid ester and benzo(a)pyrene had less tumor-producing effect than benzo(a)pyrene alone.

AIR POLLUTION ABSTRACTS, OCTOBER 1975

51813

APTIC NO. 73919

Kaneko, Y., R. Takahashi, T. Hizaki, T. Sakuma, A. Yokoyama, M. Tsutsumi, and Y. Kasahara

AIR POLLUTION AND NASAL DISEASES. (*Taiki-osen to bi-shikkan*). Text in Japanese. *Nihon Jibi Inkoka Gakkai Kaiho* (Jap. J. Otorhinolaryngol. Soc.), 78(3):30, March 1975.

An otorhinolaryngological health examination made on children in 11 schools located in air-polluted and non-polluted areas is described. Information was obtained through medical questionnaires, rhinoscopy, roentgenography of the paranasal cavity, intracutaneous allergy tests, and intranasal induction reaction. From 1972 to 1974 there was a clear difference of morbidity of nasal allergy between children in air-polluted and non-polluted areas.

51814

APTIC NO. 73915

Konno, E.

THE STATUS OF AIR POLLUTION IN THE SENDAI-SHI OGAMA DISTRICT AND AN EPIDEMIOLOGICAL INVESTIGATION THEREIN. (*Sen-En chiku no okeru taiki-osen no jittai to ekigaku chosa*). Text in Japanese. *Min-I-Ren Iryo* (J. All-Jap. Leagues Democr. Med. Inst.), no.35:76, Feb. 1975.

Information obtained by questionnaire in a health survey of people living in Sendai and Shioyama cities revealed a rapid rise in the morbidity of both cough and sputum symptomatology; an increase in morbidity of sputum in elderly persons and a high morbidity of cough in children younger than 12 was observed. Sendai and Shioyama districts have air pollution even at lower ranges than alert levels for smog episodes. Sulfur dioxide levels are increasing annually. The number of stationary sources for air pollution is increasing with completion of chemical complexes and morbidity of chronic respiratory diseases is increasing, especially in the elderly and children.

51815

APTIC NO. 74125

Matsuoka, M.

AIR POLLUTION AND HEALTH OF NURSE PERSONNEL FOR SCHOOLCHILDREN IN SETAGAYA WARD, TOKYO. (*Setagayaku no taikiosen to gakudoyogoin no kenko*). Text in Japanese. Preprint, Executive Committee for Symposium of Environmental Sciences, Tokyo (Japan), p. 286-287, 1975. (Presented at the Executive Committee for Symposium of Environmental Sciences, 1st Research Presentation Meeting, Tokyo, Japan, June 6-8, 1975.)

Physical examinations of 112 female traffic guides for schoolchildren were performed. All but one of the guides showed abnormalities, and two subsequently died. The cause of the abnormalities was suspected to be air pollution from automobile exhaust. Nitrogen dioxide concentrations in Setagaya ranged from 0.490-0.146 ppm. Subjective symptoms included headache 44.4%, colds 30.6%, difficulty in sleeping 14%, and irritability 23.9%.

51816

APTIC NO. 73916

Nagano, J. and T. Inoue

RESPIRATORY DISEASES RECENTLY ATTRACTING NOTICE. RESPIRATORY DISEASES DUE TO AIR POLLUTION. (*Saikin chumoku sareteiru kokyuki shikkan*). Text in Japanese. *Chiryō* (Therapy), 57(3):767-772, March 1975. 22 refs.

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Origins of air pollutants such as sulfur dioxide, nitrogen oxides, carbon monoxide, ozone, organic and inorganic dusts, and benzopyrene are described and respiratory disturbances in an air polluted area, which show some differences as to the complexity of the pollution, are described with reference to respiratory diseases in Yokkaichi City. Contributions of host factors and pathological changes of the lung due to sulfur dioxide, nitrogen dioxide, ozone and carbon dioxide are described. The methods used for diagnosis of respiratory diseases are discussed with methods of treatment, including desensitization to pathogenic allergens.

51817

APTIC NO. 73929

Nakajima, Y. and S. Kusumoto

BIOLOGICAL EFFECTS OF PHOTOCHEMICAL SMOG. (Kokagaku smog no seitai eikyo). Text in Japanese. Preprint, Japan Society of General Research, Div. of Environmental Science, p. 56-57, 1975. (Presented at the Japan Society of General Research Environmental Science Division Meeting, 1st, Tokyo, Japan, June 6-8, 1975, Paper 021.)

Japanese people suffering from photochemical smog number about 134,000 since 1970 and the injuries occurred at lower concentrations of air pollutants than in Los Angeles. The chronic effects of photochemical smog are reviewed, including studies on the degeneration of rabbit respiratory organs, and loss of immunological functions, especially those of interferon production and proliferation of peripheral bronchiolar epithelial cells in dogs and mice. Damage to the alveolar epithelial cells in mice relate to human lung cancer after chronic exposure to oxidant is described.

51818

APTIC NO. 74124

Okayasu, Masahito

LOCAL-IMMUNITY IN AIRWAY AND TRANS-TRACHEO-BRONCHIAL IMMUNIZATION. (Kido no kyokusho-meneki to kei-kido meneki). Text in Japanese. Nihon Kikan-Shokudoka Gakkai Kaiho (J. Japan Broncho-Esophagolog. Soc.), 26(2):82-87, 1975. 7 refs.

After examining the relation between trans-airway inoculation of antigen and production of antibody, the influence of air pollution (sulfur dioxide and ozone) on trans-airway immunity was studied. Rabbits were exposed to 100 and 300 ppm of sulfur dioxide for 1 hr, and inactivated influenza virus was then infused via the trachea. The serum antibody value increased more than that of animals not exposed to sulfur dioxide; however, exposure to higher SO₂ concentrations lowered the tendency of increase. After exposing the animals to 10 ppm of ozone, bovine serum albumin was infused via the trachea. The value of serum antibody was higher than that in animals not exposed. The same results were observed after the subcutaneous injection of antigens following sulfur dioxide or ozone exposures.

51819

APTIC NO. 73918

Sakakura, Y., Y. Miyoshi, K. Ukai, Y. Majima, and S. Yui

EFFECTS OF SULFUR DIOXIDE ON AIRWAY INFECTION TO VIRUS. (Aryusan gas to kido virus kansens). Text in Japanese. Nihon Jibi Inkoka Gakkai Kaiho (Jap. J. Otorhinolaryngol. Soc.), 78(3):30, March 1975.

After exposure to sulfur dioxide, mice were inoculated with influenza virus and examined for histopathology, condition of the nasoseptal respiratory epithelium, and inhibition of erythrocyte coagulation and interferon. Sulfur dioxide acts synergistically with the virus infection, suggesting activation of antibody production. This phenomenon was more conspicuous in animals exposed to sulfur dioxide at a younger age. Synthesis of DNA was also inhibited in the early stage of viral infection. Sulfur dioxide did not affect the production of interferon.

51820

APTIC NO. 72332

Sato, S., M. Kawakami, T. Hirose, S. Shimura, S. Maeda, and T. Takishima

ULTRAMICROMORPHOLOGICAL STUDIES ON OZONE INJURY IN (ALPHA) TOCOPHEROL-DEFICIENT RATS. (Alpha-Tocopherol ketsubo to ozone shogai ni kansuru chobikeitaigakuteki kenkyu). Text in Japanese. Nihon Kyobu Shikkan Gakkai Zasshi (Japan. J. Thoracic Dis.), no. 13:50, March 1975.

After feeding rats an (alpha)tocopherol-deficient diet for 98 days the animals were exposed to ozone at a concentration of 0.2-0.4 ppm, 3 hr/day, for 16 days. During the exposure period some animals were killed on the 1st, 5th, 11th, and 16th day, then their dissected specimens were observed by scanning- and common electron microscope. Edematous swelling of the I-type alveolar epithelium was conspicuous, and especially after the 5th day rupture and ablation of the I-type alveolar epithelium were seen by electron microscope. With a scanning electron microscope alveolar projection and dispersed corpuscles could be noticed. Rats fed on an ordinary diet for 98 days and exposed to ozone under the same conditions showed no change in alveolar epithelium. However, on the 16th day, a ring formation of epithelial cells was found in both groups. The protective action of alpha-tocopherol is thus shown and the possibility of its role in anti-oxidation anti-oxidative disturbances is suggested.

51821

APTIC NO. 73913

Takagi, H.

EXPERIENCE OF RESPIRATORY DISEASES AND ASTHMA ON OUTPATIENTS IN MIZUSHIMA DISTRICT. (Mizushima chiku ni okeru kokyuki shikkan to zensou gairai no keiken). Text in Japanese. Min-I-Ren Iryo (J. All-Jap. Leagues Democr. Med. Inst.), no. 35:81, Feb. 1975.

In the Mizushima district of Kurashiki City the number of patients with respiratory disease has increased since industrialization; the number of outpatients of the hospital amounted to 259 in May 1974. The frequency of asthmatic attack paroxysm is high throughout the year. Chronic obstructive pulmonary diseases accompany the spread of industrialization. The ratio of bronchial asthmatic inpatients to total patients has increased rapidly to 6.3%.

51822

APTIC NO. 74174

Takizawa, Yoshiro and Toshihiko Iizuka

EFFECTS OF SULFUR DIOXIDE AND CARBON DIOXIDE ON THE GROWTH OF SILKWORM LARVAE. (Kasan yochu ni oyobosu nisanka io, tansangasu no eikyo). Text in Japanese. Hokkaido Daigaku Nogakubu Hobun Kiyo (Mem. Fac. Agric., Hokkaido Univ.), 9(2):141-143, 1975. 9 refs.

The acute mortality of silkworm larvae exposed to sulfur dioxide and carbon dioxide was studied. The larvae were exposed to sulfur dioxide concentrations of 500, 300, 100 and 50 ppm and to carbon dioxide concentrations of 2.6 and 1.4% for 12 hr (on the first half day of each instar, except second instar on the second half day). No deaths were observed at 1.4% carbon dioxide for every instar; however, at 2.6% carbon dioxide, the mortality ratios of each instar were 0, 5/50, 8/50, 29/50 and 31/50. No deaths were observed at 50 ppm of sulfur dioxide exposure; the death ratio was 50/50 at 500 ppm. The lethal concentration of sulfur dioxide was 100 - 300 ppm for larvae in first and second instar and 50 - 100 ppm for those in third, fourth, and fifth instar. The silkworm larva's resistance to these two gases decreased as the instar increased.

51823

APTIC NO. 72324

Tsukune, H., S. Ueda, K. Hayashi, S. Matsumoto, F. Hayashida, N. Ishii, and T. Hagiwara

ULTRAMICROMORPHOLOGICAL STUDIES ON THE SURFACE LAYER OF THE ALVEOLI. (Haiho hyomen

hifukuso ni kansuru chobikeitaigakuteki kenkyu). Text in Japanese. *Nihon Kyobu Shikkan Gakkai Zasshi* (Japan. J. Thoracic Dis.), vol. 13:50, March 1975. (Presented at the Japanese Society of Thoracic Diseases, Annual Meeting, April 1975.)

Mice and rabbits were exposed to ozone at 10 ppm; and the lungs of control and treated animals were washed; both the washings and the cleaned lungs were ultramicroscopically examined. Lungs of control animals showed adhesion of a thin membrane-like substance with a high electron reactivity. A reaction of B-type epithelial inclusions and the membrane-like substance originating from the body were noted. Lungs of treated animals showed a diluted mucosal surface layer on the parts with conspicuous exudation.

51824

APTIC NO. 74189

Ulfvarson, Ulf

CHEMICAL RISK FACTORS INVOLVED IN RUST-PREVENTION PAINTING. (Kemiska riskfaktorer vid rostskyddsmalning). Text in Swedish. *Mod. Ytbehandling*, no. 1-2:16-20, 1975.

Health hazards involved in surface pretreatment and rust-prevention painting are discussed. Sand-blasting implies serious hazards due to fine quartz dust, and both sand-blasting and flame-cleaning of bare or painted surfaces may generate particulate emissions from the surface, containing lead, mercury, arsenic, zinc, and chromium. Flame-cleaning also generates carbon monoxide and nitrogen oxides due to the high temperatures used. Alkaline degreasing of metal surfaces may be associated with the release of irritating alkaline particles and vapors. Pickling with hydrofluoric acid and nitric acid involves irritating acid emissions, which may be fatal when inhaled for a prolonged time, especially in the case of nitrous gases. Paint, paint-coated dust particles, and solvent vapors represent considerable health hazards during finishing operations. Vapors of phenol resins and ammonia are powerful irritants. Pigments, containing toxic metals, are especially hazardous because they are in the form of very small, respirable particles. While many solvents have narcotic and irritating effects, benzene interferes with the hemopoietic organs.

51825

APTIC NO. 74163

Yoshida, Yutaka

AIR POLLUTION AND RESPIRATORY INFECTION IN INFANTILE AIRWAY DISEASES. (Taikiosen to kansen no shonikidokei byohen). Text in Japanese. *Nihon Kikan-Shokudoka Gakkai Kaiho* (J. Japan Broncho-Esophagology Soc.), 26(2):62-67, 1975. 3 refs.

Subjective respiratory symptoms of children in Tokyo and values of respiratory resistance of children in Kawasaki are described. The bronchial biopsy of a child whose wet cough persisted for more than 6 mo and the results of a electron-microscopical examination of alveolar cells (type II) from young matured rats exposed to nitrogen dioxide at high concentration are also reported. Air pollution-induced changes of 1-second rate and respiratory resistance in children were reversible, transient, and too small to be detected. Edema of bronchial mucosa, bronchial contracture, and an increase of secretion result from the stimulating action of air pollution on airway system, leading to a reduction in the protective functions against infection.

51826

APTIC NO. 73712

Tokyo Metropolitan Research Inst. for Environmental Protection

LATENT EFFECTS OF AIR POLLUTION ON HUMAN BODY, ESPECIALLY THEIR RELATIONSHIP TO CHRONIC OBSTRUCTIVE PULMONARY DISEASES. In: *Annual Report of the Tokyo Metropolitan Research Institute for Environmental Protection*, p. 63-73, 1975.

Clinical examinations and medical histories for 181 residents in an industrially polluted area and 63 residents in a nonpolluted

area were performed to assess the latent effects of air pollution on human health. No significant differences were observed in chest radiographs, respiratory functions, and immuno-serological values between the two groups. Higher values of blood lead and lower delta-aminolevulinic acid dehydratase activities, however, were observed in the polluted population. Hematocrit, a general barometer of health impairment, showed little difference between the two populations. Urinary aminolevulinic acid values also exhibited little variation between the two groups. Thus, AIA-D activity appears to be a potentially useful indicator for observing regional differences in air pollution health effects when other indicators fail to reveal such differences.

51827

APTIC NO. 73875

TRACE METAL ANALYSES IN TISSUE. In: *Annual Report of the Biomedical and Environmental Research Program of the LASL Health Division*. California Univ., Los Alamos, N. Mex., Los Alamos Scientific Lab., Energy Research and Development Administration Contract W-7405-ENG. 36, Rept. UC-48, p. 41-42, Feb. 1975. 1 ref.

NTIS: LA-5883-PR

Experiments involving the use of anodic stripping voltammetry for the determination of nanogram quantities of various trace metals (associated with fossil fuel combustion) in human tissue are described. The method permits four samples to be run simultaneously and is precise to + or - 5 to + or - 15% for samples containing 100 to 1.0 nanograms, respectively, of metal ion mixtures. Cadmium, lead, and copper are obtained readily; and bismuth, thallium, and zinc may also be analyzed with some changes either in solution composition or electrode coating. Analyses of trace quantities of Cd, Pb, and Cu in lung and liver tissue show results that fall within reported ranges.

51828

APTIC NO. 74115

ENVIRONMENTAL POLLUTION AND HYGIENE.

(Kogei Eisei). Text in Japanese. Tokei Kawasaki (Environ. Stat. Kawasaki), no. 80:28-29, 1975.

Japanese air quality data and related health statistics are presented for the years 1973 and 1974. Average oxidant and sulfur dioxide concentrations in 1973 ranged from 0.026 ppm at Tama to 0.038 ppm at Takatsu and 0.019 ppm at Nakahara to 0.049 ppm at Tajima, respectively. There were 2129 registered pollution victims at the end of 1974, including 1333 bronchial asthma, 414 chronic bronchitis, 297 asthmatic bronchitis and 85 pulmonary emphysema cases.

51829

APTIC NO. 74148

Fukuoka Prefectural Office (Japan)

PART 3. RESULTS OF HEALTH EFFECTS SURVEY IN HABITANTS EXPOSED TO COMPLEX AIR POLLUTION DURING 1973. (Dai 3-setsu. Showa 48 nendo fukuoka taikiosen kenko eikyo chosa). Text in Japanese. In: *Fukuoka Prefectural White Paper on the Environment*, p. 124-132, 1975.

The effects of air pollution of Omuta and Fukuoka Cities were studied. These were 434 air pollution victims in Omuta and 479 in Fukuoka during 1973. Air pollutants identified included oxides of sulfur and nitrogen, carbon monoxide, dust, suspended particulates, and 16 heavy metals. The average sulfur oxide concentration in Fukuoka was 0.010 - 0.013 ppm and 0.025 - 0.037 ppm in Omuta. Dust fall in Fukuoka was 4.86 - 6.86 and in Omuta 12.88 tons/sq km mo; suspended particulates in Fukuoka were 0.030 - 0.042 and 0.055 - 0.097 mg/cu m in Omuta. Nitric oxide levels ranged from 0.01-0.02 ppm. Pollution-related illnesses included chronic bronchitis, obstructive disturbances, and sputum expectoration. Urinary chromium values averaged 7.09 micrograms/l to 7.13 micrograms/l, and urinary selenium averaged 15.9 micrograms/l to 12.5 micrograms/l. The health effects of air pollution were more severe in Omuta than in Fukuoka.

1974

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APTIC NO. 75336

Abdullah, Mohammed, Bo Arnesjo, and Ingemar Ihse

METHYLATION OF MERCURY IN INTESTINAL DISEASES? (*Metylering av kvicksilver vid tarmsjukdomar?*) *Läkartidningen*, 71(9):810-812, 1974. 12 refs. Translated from Swedish. Scitran Scientific Translation Service, Santa Barbara, Calif., 13p.

The formation of methyl mercury in intestinal blind loops of rats fed inorganic mercury is discussed in relation to the increased risk of mercury poisoning in patients with intestinal diseases involving increased bacterial flora. Levels of methyl mercury in the brain, blood corpuscles, plasma, liver, bile, and kidneys of rats surgically equipped with an antiperistaltic intestinal blind loop located 5 cm below the start of the jejunum were significantly increased in comparison to controls, suggesting that the pathologic bacterial flora developed in a small intestinal blind loop is capable of causing a considerable degree of methylation. All of the blind loop rats also exhibited severe neurologic symptoms in the form of paralysis in the hind legs. An increased risk to mercury poisoning in patients with small intestine diverticulosis, multiple small intestine stenosis, and Crohn's disease or in post-surgery patients appears possible due to the action of pathologic intestinal flora which may occur during these conditions.

51831

APTIC NO. 73786

Adachi, T. and T. Nakashima

ON THE EFFECTS OF AIR POLLUTION ON THE HEALTH OF TSURUSAKI, OITA PREF. PART III. (*Oita-shi Tsurusaki-chiku ni okeru taiki osen no kenko no oyobosu eikyo ni suite (dai3po)*). Text in Japanese. *Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution)*, 9(2):323, Nov. 1974.

The results of an investigation on the frequency of consulting physicians for specified diseases such as cold, bronchitis, bronchial asthma, pneumonia, tonsillitis, laryngopharyngitis, and others from 1969-1970, 1971, 1972, and 1973 in the Tsurusaki coastal industrial zone of Oita Prefecture are reported. The frequency was divided into those of polluted area, slightly polluted area, and controlled area. In every year, the frequency was largest in the polluted area. Of the specified diseases the frequency for cold was highest in all three areas and was most frequent in the polluted area (1.5-1.8 times that of the other two areas), the cause seemingly being due to the prevalence of influenza. Local differences in the frequency of bronchitis, bronchial asthma and pneumonia were not found. The frequency of laryngopharyngitis was highest in the polluted area. When the frequency was classified by age, the frequency for cold, bronchitis, tonsillitis and laryngopharyngitis was higher in the polluted area in every age group. The frequency of consulting physicians of babies (0-4 years old) for colds was very high in the polluted area; every child visited a physician for colds 1.3 times/yr.

51832

APTIC NO. 71933

Berry, Wade L. and Arthur Wallace

TRACE ELEMENTS IN THE ENVIRONMENT - THEIR ROLE AND POTENTIAL TOXICITY AS RELATED TO FOSSIL FUELS - A PRELIMINARY STUDY. *California Univ., Los Angeles, Lab. of Nuclear Medicine and Radiation Biology, Atomic Energy Commission Contract AT (04-1) GEN 12, Rept. UCLA 12-946, 72p., Jan. 1974. 134 refs.*

The nature, occurrence, and effects of trace elements in the environment are reviewed along with the identification of probable hazards of trace element emissions to the environment, particularly as a result of fossil fuel power generation. The ecology of trace elements is very delicately balanced, and small additions of some trace elements from polluting sources can significantly alter an existing ecosystem. The pathways

and rates of movement of trace elements between each component of any soil-water-plant-animal system are not well defined. Generally, the lower the concentration of a trace element in nature, the higher is its toxicity. Trace elements such as cadmium and mercury are known to occur in fossil fuels in somewhat higher concentrations than elsewhere, were making the study of their emission a matter of urgency. Elements such as zinc, copper, and cobalt which are essential for life at low concentrations can be toxic at higher concentrations. The trace element composition of fossil fuels is extremely variable, resulting in a great uncertainty regarding potential toxicity problems. The fate of volatile trace elements released from fossil fuels upon combustion is largely unknown, adding further to the uncertainty. This volatile group includes: antimony, arsenic, beryllium, bromine, cadmium, fluorine, gallium, mercury, and selenium; excluding antimony, bromine, and gallium, these pose a serious hazard to man. The nonvolatile trace elements of significant abundance in fossil fuels include: boron, chromium, cobalt, copper, iodine, lead, lithium, manganese, nickel, vanadium, and zinc. These afford a lesser, but still significant, hazard. Boron is certain to present soil-plant problems whenever coal ash is applied to soil.

51833

APTIC NO. 73844

Bryce-Smith, D.

SCIENTIFIC PRIORITIES IN THE CONTROL OF POLLUTION. *Phys. Bull.*, vol. 25:178-180, 1974.

Priorities in pollution control are discussed in relation to pollutants which alone or in combination may cause adverse effects on human health at or close to present levels and pollutants which are specifically neurotoxic. Carbon monoxide, sulfur dioxide, and the neurotoxic substances dichlorodiphenyl-trichloroethane (DDT), mercury, and lead are identified as the most serious pollutants. Present levels of CO (10-30 ppm) in heavy traffic are at or near levels which can cause adverse effects in humans, especially sensitive individuals. Levels of SO₂ in urban areas of Britain consistently exceed those capable of causing increased mortality from bronchitis and lung cancer and increased respiratory illness in children. Although the thresholds for behavioral disturbances are not yet identified for neurotoxic substances like Pb, Hg, and DDT, modern levels of Pb in children average about 60% of the toxic threshold and 40% for adults. Lead appears to pose the major individual threat to behavior disturbance and nervous system damage.

51834

APTIC NO. 74151

Doussset, Clement

HUMAN ASPECTS OF THE USE OF CONCORDE. (*Aspects humains de l'exploitation de Concorde*). Text in French. *Rev. Med. Aeronaut. Spat.*, 13(52):263-272, 1974.

General human and medical aspects of the use of Concorde supersonic aircraft are discussed. Against an outside ozone concentration of 7 ppm, fractions of 1 ppm were measured on-board during flight. Any relationship between the injection of nitric oxide into the stratosphere by supersonic aircraft and the stratospheric ozone concentration is doubtful because the latter has shown rather regular fluctuations both before and after the appearance of supersonic aircraft. On the other hand, Concorde represents a major contribution to stratospheric air pollution studies. The findings indicate that the health aspects of Concorde are negligible, or at best completely controllable.

51835

APTIC NO. 73885

Frappa, J.

THE ACTION OF AIR POLLUTANTS ON CULTURED MAMMALIAN BUCCAL CELLS. (*Action des microconstituants atmospheriques (M.C.A.) sur des cellules buccales de Mammiferes mises en culture*). Text in French. *J. Med. Lyon*, no. 55:525-535, April 1974. 13 refs.

The effect of atmospheric particulates smaller than 10 micron, fractionated into organic-mineral complex, organic, and inor-

ganic fractions, as well as of synthesized hydrocarbons, such as benzo(a)pyrene, benzo(a)anthracene, benzo(ghi)perylene, and coronene, on fetal calf buccal cells was studied in vitro. Dose-dependent inhibition of cell growth, reduction of cell count, clustering of cells, loss of cellular orientation, and cytoplasmic hyperchromasia were observed in cultures incubated with the organo-mineral complex and with the inorganic fraction 48 hr after incubation, while the inorganic fraction had no effect on cell growth. The synthetic hydrocarbons manifested their cytotoxic effect after 48 hr. The organic-mineral and organic fractions depressed the cellular respiration from the first hour of incubation, after which they stimulated cellular respiration. Synthetic hydrocarbons exerted a similar effect. The organic-mineral complex and the organic fraction reduced the respiration of tissue explants by 44% and 42%, respectively, while the inorganic fraction exerted a stimulating effect.

51836

APTIC NO. 73788

Fukase, O., K. Isomura, and H. Watanabe

EFFECTS OF OZONE ON THE REDUCING SUBSTANCE IN THE LUNG. (*Ozon no hai kangen busshitsu eno eikyo*). Text in Japanese. *Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution)*, 9(2):329, Nov. 1974. 6 refs.

After repeated exposure to ozone at 0.2, 0.5 and 1.0 ppm, 4 hr/day for 7 days, glutathione and vitamin C in the lung of exposed mice increased proportionally to the ozone concentration as also did the activities of glucose-6-phosphate dehydrogenase, glutathione reductase, and glutathione peroxidase. In mice to which 0.1 millimole of L-ascorbic acid was intraperitoneally injected before ozone exposure, such an increase of reducing substances and activities of enzymes did not appear. The increase of the reducing substances and the activities of enzymes in the lung of exposed animals to ozone was considered to be a protective reaction to ozone. Vitamin C reduced the action of ozone to the lung.

51837

APTIC NO. 73785

Fukuchi, Y., S. Watanabe, K. Wakaba, J. Kankawa, H. Tsubaki, and N. Daikaku

EFFECTS OF AIR POLLUTION ON HEALTH IN COLD REGIONS. (*Kanreichi ni okeru taiki osen no eikyo*). Text in Japanese. *Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution)*, 9(2):324, Nov. 1974.

The effects of air pollution on human health, especially the morbidity of chronic bronchitis, were investigated in several parts of Hokkaido. The method of investigation was by questionnaires (BMRC system), and the objects were inhabitants in three cities and seven districts, all older than 40. The morbidity of chronic bronchitis (Fletcher's designation) ranged from 15.4-5.1% in men and 8.2-1.9% in women and in every city the other respiratory morbidities were larger in men than in women. In every city and in almost all respiratory diseases, the morbidity of respiratory diseases was significantly larger in polluted districts than in slight- and non-polluted areas. Although the morbidity of chronic bronchitis increased as the concentration of sulfur oxides increased, the value differed conspicuously from the estimated value from the formula of Shimizu et al, suggesting the specificity of appearance of the effect of air pollution.

51838

APTIC NO. 74241

Gauss, G.

REDUCED RESISTANCE TO ENVIRONMENTAL POISONS IN LARGE ANIMAL POPULATIONS. (*Verminderte Resistenz gegenueber Umweltgiften bei Massentierhaltung*). Text in German. *Fortschr. Veterinaermed.*, vol. 20:255-260, 1974. 19 refs.

Adult male rats subjected to sociopsychological stress by being housed 15/cage for 4-6 wk were more sensitive to carbon monoxide exposure (5000-8000 ppm for 2 hr) than quiet or moderately excited rats housed 8/cage. Survivals for the

stressed rats were 2 and 10% at the 3-day median lethal dose and 20% lethal dose, respectively, for quiet control rats. The increased CO sensitivity of the stressed rats appeared to result from increased brain metabolism as indicated by increased tritiated leucine incorporation into ganglia as well as the development of cerebral edema. Unilateral carotid ligation, which is known to increase brain metabolism, also increased the CO sensitivity and extent of cerebral edema of stressed rats. Secondary damage in the testes, ovaries, and kidneys of CO exposed mice that were stressed indicated depressed sexual hormone release and decreased blood supply.

51839

APTIC NO. 71966

Harrington, R. E.

FINE PARTICULATES - THE MISUNDERSTOOD AIR POLLUTANT. Environmental Protection Agency, Research Triangle Park, N. C., Control Systems Lab. and A.P.T., Inc., Riverside, Calif., Fine Part. Scrubber Symp., San Diego, Calif., 1974, EPA-650/2-74-112, p. 1-11. (May 28-30.) (Complete proceedings processed under APTIC 75055.)

NTIS: PB 239335/AS

The health basis for fine particulate control is discussed. Over 50% of the number of particles between 0.01 and 0.1 micron that penetrate into the pulmonary tract are deposited. Although the health effects of fine particulates that penetrate the respiratory system and are captured are almost completely dependent on the chemical nature of the particles, sufficient information exists to conclude that fine particulates must be controlled if public health is to be protected. In addition to the chemical and toxic nature of particulates, their solubility in transport mucus, if high enough, can cause toxic inflammation. Scrubbers offer considerable potential for fine particulate control, particularly when maximum use of filtration or electrostatic mechanisms are employed.

51840

APTIC NO. 73787

Ichikawa, I. and E. Yokoyama

ACTIVITY OF PHOSPHOLIPASE IN THE LUNG OF RATS EXPOSED TO OZONE AND NO₂. (*O3 oyobi NO2 bakuro ratto no hai ni okeru hosuhoripaze kasei*). Text in Japanese. *Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution)*, 9(2):330, Nov. 1974.

The activity of phospholipase A in the homogenate of the lung of rats exposed respectively to ozone and nitrogen dioxide increased, the increase being higher as the exposure period and the concentration of the pollutant were increased. The increase of the activity of phospholipases A1 and A2, and total phospholipase due to exposure to a mixture of ozone and nitrogen dioxide was significant, and the degree of the increase corresponded to that which appeared at the highest exposure to ozone or nitrogen dioxide separately.

51841

APTIC NO. 73790

Ichikawa, I. and E. Yokohama

EFFECTS OF OZONE ON THE COMPOSITION OF FATTY ACIDS COMPOSING PHOSPHOLIPIDS IN THE LUNG OF RATS. (*Ratto hai rinshishitsu kosei shibosan sosai ni taisuru O3 no eikyo*). Text in Japanese. *Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution)*, 9(2):331, Nov. 1974.

The effects of ozone on the composition of fatty acids of phosphatidyl choline and phosphatidyl ethanolamine, both of which are the main components of phospholipid in the lung of rats, were examined. Rats of the SPF Wistar strain, 4 and 9 wk and 6 mo after birth, were exposed to ozone under several conditions, and their phosphatidyl choline and ethanolamine were isolated from the lungs. The ratio of the fatty acid (C16 without double bond) which comprises 70-80% of all the fatty acids of phosphatidyl choline increased with the increase of ozone concentration, but the ratio of the fatty acid (C20 with four double bonds) decreased. No effect of ozone was found

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on the fatty acids (C16 without double bond and C20 with four double bonds) of phosphatidyl-ethanolamine. The fatty acid (C16 without double bond of phosphatidyl choline in the washings of alveoli showed a trend of decrease following ozone exposure.

51842

APTIC NO. 72319

Kandus, J. and M. Menzlova

PREVALENCE OF CHRONIC BRONCHITIS IN THE POPULATION OF AN URBAN INDUSTRIAL AGGLOMERATION. (*Vyskyt chronické bronchitidy u obyvatel městské průmyslové aglomerace*). Text in Czech. *Casopis Lekaru Ceskyh* (Prague), 113(42):1293-1297, 1974. 16 refs.

The prevalence of chronic bronchitis in males aged 30-59 yr living for more than 5 yr in large industrial towns was investigated. The general prevalence of chronic productive cough as assessed by a standardized method in 2094 probands was 24.5%, with the degree of prevalence depending on age and smoking habits. The removal of these two factors resulted in no relationship between chronic bronchitis and atmospheric pollution. Occupational exposure to dust, however, showed a negative influence on chronic bronchitis. Ventilation parameters declined linearly with age.

51843

APTIC NO. 73797

Kusumoto, S., Y. Tsubota, E. Yonekawa, H. Oda, H. Nogami, T. Nakajima, and M. Kubo

COMPARISON OF THE EFFECTS OF PHOTOCHEMICAL OXIDANT AND OZONE ON MICE. (*Kokagaku okishidanto to ozon no mausu ni oyobosu eikyo no hikaku*). Text in Japanese. *Taiki Osen Kenkyu* (J. Japan. Soc. Air Pollution), 9(2):335, Nov. 1974. 1 ref.

The body temperature (rectal), the number of leukocytes, and the leukocyte index of two groups of mice, one of which were exposed to photochemical oxidant at average concentrations of 0.24-0.58 ppm and the other of which were exposed to ozone at concentrations of 1, 2, 3 and 5 ppm, were determined, the period of exposure being 3-3.5 hr. The body temperature just after exposure to photochemical oxidant showed no increase or a slight increase, and it showed a similar tendency after exposure at less than 0.5 ppm. However, it showed a decreasing tendency at more than 0.5 ppm, then showed a marked decrease at more than 3 ppm. The cases in which leukocyte numbers significantly increased were exposure to photochemical oxidant at more than 0.4 ppm and exposure to ozone at 3 ppm. The leukocyte index showed an increase just after exposure to photochemical oxidant in almost all cases, and it showed an increase 3 hr after exposure to ozone at 2 ppm. It also showed an increase after exposure to a mixed gas with the same composition as photochemical oxidant without irradiation by ultraviolet light.

51844

APTIC NO. 74136

Lafuma, J.

STUDIES ON THE BIOLOGICAL EFFECTS OF AIR POLLUTANTS. (*Recherches sur les effets biologiques des polluants atmosphériques*). Text in French. *Bull. Inform. Sci. et Tech.*, no. 191:91-95, April 1974. 7 refs.

The purification capacity of animal lungs following radioactive hematite (iron oxide) inhalation was evaluated. The elimination of inhaled hematite from the rats and cats was largely a linear function of time. During the initial stage of the elimination, hematite deposited in the upper respiratory tract and was rapidly eliminated in the feces during the first 2 days. Another portion deposited in the alveoli and was eliminated together with lung macrophages. During the second stage of the elimination, the hematite aerosol deposited in the alveoli and was eliminated by another fraction of macrophages. Prestressing the animals via preliminary inhalation of silica, carbon and titanium oxide dusts lowered the rate of hematite elimination. Silica and carbon particles were most toxic, while titanium oxide caused an insignificant reduction in the rate of hematite elimination.

51845

APTIC NO. 74184

Masse, Lucien, Paul Damiani, and Helene Masse

TOBACCO AND URBANIZATION; TWO FACTORS OF MORTALITY. (*Le tabac et l'urbanisation, facteurs de mortalité*). Text in French. *Bull. Acad. Nat. Med. (Paris)*, 158(5):354-361, May 1974. 7 refs.

The effect of urbanization and of tobacco on mortality was studied in urban and rural male and female populations in an age bracket of 45-64 yr by statistical analysis. Close correlation with a factor of 0.579 was established between tobacco and bronchopulmonary cancer. The correlation coefficients established between tobacco and cardiac diseases and between urbanization and bronchopulmonary diseases are 0.327 and 0.387, respectively, for the male populations. After elimination of the influence of other factors, correlation coefficients of 0.500 and 0.257 were obtained for the relationships between tobacco and bronchopulmonary cancer, and between tobacco and cardiac diseases. The correlation coefficient for the relationship between urbanization alone and bronchopulmonary cancer was 0.203. In the male population, the correlation coefficient for the relationship between tobacco and urbanization combined and bronchopulmonary cancer was 0.602, and between tobacco plus urbanization and pneumonia 0.206. Significant correlation with a coefficient of 0.338 was established between tobacco and cardiac diseases in the rural population.

51846

APTIC NO. 74254

Muroya, Hideyuki and Tamenobu Kubota

A RAPID SPECTROPHOTOMETRIC DETERMINATION OF CARBOXYHEMOGLOBIN IN BLOOD. *Bull. Tokyo Med. Dent. Univ.*, 21(1):67-77, 1974. 11 refs.

A method for the rapid spectrophotometric determination of carboxyhemoglobin in blood is described. A heparinized whole blood sample, diluted to about 1:100-1:200, is placed in a cuvette, and the absorbance is measured at the wavelengths of 413.2 nm, 421 nm, and 431.3 nm against water as the zero reference standard. The absorbances of standard solutions of 0% COHb and 100% COHb are also measured, and these are then used for calculating the COHb concentration in the blood sample. The absorbance determinations for the 0 and 100% COHb solutions can be omitted by using an appropriate factor derived during the calibration of the spectrophotometer. (Author abstract modified)

51847

APTIC NO. 73859

Nettesheim, P., H. Schreiber, D. A. Creasia, and C. B. Richter
RESPIRATORY INFECTIONS AND THE PATHOGENESIS OF LUNG CANCER. Preprint, National Cancer Inst., Bethesda, Md. and Atomic Energy Commission, Oak Ridge, Tenn., Oak Ridge National Lab., 20p., 1974 (?). 52 refs.

Laboratory animal experiments investigating the possible role of respiratory infection in the pathogenesis of lung cancer are reviewed. Although there is no single answer to the question concerning the role of respiratory infection in the development of lung tumors, studies of lung tumor response and respiratory infection indicate the following: influenza virus infection in mice appears to suppress the pulmonary adenoma response induced by the chronic inhalation of carcinogens; squamous cell carcinoma can develop in mice exposed to synthetic smog and influenza virus; and a significantly increased squamous cell lung tumor response to a cyclic nitrosamine is observed in rats suffering from chronic murine pneumonia. Lung clearance studies indicate that respiratory infection can significantly alter the distribution of inhaled and intratracheally deposited particulates and can markedly increase the pulmonary residence time of particles deposited in the peripheral segments of the respiratory tract. Studies of the arylhydroxylase levels in the respiratory tract show a marked alteration of benzo(3,4)pyrene metabolism during the course of influenza pneumonitis. Other studies point toward the importance of investigating the changes in immunocompetence of the lung and lung-associated

lymphatic tissues occurring during respiratory tract infection. (Author summary modified)

51848

APTIC NO. 74155

Nikitina, N. G.

EFFECT OF MOTOR TRANSPORT NOISE AND ATMOSPHERIC AIR GASES ON THE ORGANISM.

(Vliyaniye avtotransportnogo shuma i zagazovannosti atmosfery na organizm). Text in Russian. Vrachebnoe Delo (Kiev), no. 10:123-126, 1974. 6 refs.

The prolonged effect of traffic noise, carbon monoxide, and their combinations on the physiological status of albino rats was studied in a 3-month experiment to assess the effect of automobile traffic and exhaust gases. Reduced gain in weight, a substantial decrease of the index of rapid potentials in the occipital lobe of the cerebrum, reduction of the cholinesterase levels in the blood, brain, and subcortical tissues, and blockade of the sulfhydryl groups in the blood and cerebrum were determined in animals exposed to 60-80 dB and 20 mg/cu m CO. Similar changes were observed in animals exposed to 45-55 dB and 1 mg/cu m CO. A combination of 40-50 dB with 0.66 mg/cu m CO also caused significant changes, while no significant changes were detected in animals exposed to this noise level or CO concentration alone. The incorporation of radioactive carbon in the brain, heart, and liver after exposure to noise and CO indicates the lesion of these organs under the combined effect.

51849

APTIC NO. 73762

Nimmo, Bruce, Jack Stout, John Mickus, David Vickers, and Brooks Madsen

ECOLOGICAL EFFECTS AND ENVIRONMENTAL FATE OF SOLID ROCKET EXHAUST (ANNUAL REPORT). Florida Technological Univ., Orlando, National Aeronautics and Space Administration Grant NGR 10-019-009, NASA-CR-140598, 51p., Oct. 15, 1974. 21 refs.

NTIS: N75-10616

Laboratory and field studies of the ecological effects and environmental fate of solid rocket exhaust were conducted. The exposure of Citria seedlings, English peas, and bush beans to solid rocket motor exhaust under laboratory conditions demonstrated reduced growth rates, but only at very high concentrations (400-500 ppm hydrogen chloride). Field studies of natural plant populations in three diverse ecosystems failed to reveal any structural damage at concentrations of 5-100 ppm HCl. The effect of SRM exhaust on the primary production of a salt marsh is still under investigation. The median lethal dose for a native mouse (*Peromyscus gossypinus*) exposed to SRM exhaust was 50 ppm/g body weight. Other components of the SRM exhaust appeared to act synergistically to enhance the toxic effects of HCl gas when inhaled. Experimentation on the impact of SRM exhaust on the hatchability of incubating bird eggs is presently being performed and conclusions are premature. (Author abstract modified)

51850

APTIC NO. 73798

Oda, H., H. Nogami, S. Kusumoto, and T. Nakajima

ON THE AMOUNTS OF NO-HB, MET-HB AND CO-HB IN THE MOUSE EXPOSED TO A GASEOUS MIXTURE OF NO AND CO. (NO-CO kongo bakuru mausu no NOHb, MetHb, COHb-ryo ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):336, Nov. 1974.

Female 8-week old mice JCL-ICR strain were exposed to nitric oxide at 9.5 and 66 ppm for 3 and 1.5 hr, to carbon monoxide at 100 and 500 ppm for 3 and 1.5 hr, and to a gaseous mixture of NO and CO (9.5 plus 100 ppm for 3 hr and 66 plus 500 ppm for 1.5 hr). The content of nitrogen dioxide was 1.8 ppm in NO at 9.5 ppm and 36 ppm in NO at 66 ppm. It was found that NO-hemoglobin was formed with methemoglobin after the exposure to NO, and the amount of methemoglobin increased with the increase of NO, a correla-

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tion being found between the amounts of NO-hemoglobin and methemoglobin at 66 ppm of NO exposure. When exposed to a gaseous mixture, the amount of NO hemoglobin, methemoglobin, and carboxyhemoglobin showed no difference from that when exposed the separate components CO and NO. The action of NO and CO was additive concerning the formation of NO-hemoglobin and methemoglobin with a very small mutual action, if any.

51851

APTIC NO. 73000

Osada, N., M. Matsumoto, Y. Misumi, M. Ohira, and H. Aoyama

MORBIDITIES OF SPECIFIED DISEASES BY MONITOR-SYSTEM OF YAMAGUCHI PREF. MED. SOC. (Yamaguchi ken ishikai ni okeru monita hoshiki ni yoru tokutei shikkan no yusho-ritsu dai 2ho). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):322, Nov. 1974.

By the efforts of 217 monitor physicians, an investigation was carried out on all visiting patients on the 21st of every month except for Sundays. The morbidity of asthmatic bronchitis, chronic bronchitis, bronchial asthma, pulmonary emphysema, and lung cancer represented by population ratios provided a good reflection of local states of air pollution.

51852

APTIC NO. 73799

Oshima, H., M. Imai, T. Kawagishi, and K. Tomono

ON THE EPIDEMIOLOGICAL INVESTIGATION OF AIR POLLUTION IN KUSUNOKIMACHI, MIE PREFECTURE. (Mie-ken Kusunoki-machi ni okeru taiki osen no ekigaku chosa ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):321, Nov. 1974.

The concentration of sulfur dioxide in the air of Kusunokimachi, which is a town neighboring the Petroleum Combination of Yokkaichi across the Suzuka-river and having a population of 12,000, from 1962 to 1973 was respectively, 0.49, 0.64, 0.54, 0.66, 0.79, 1.07, 1.45, 1.07, 1.15, 1.44, 1.13 and 0.82 mg/day/100 sq cm (lead dioxide method). The frequency of consulting physicians for several diseases divided by the number of people under national health insurance and multiplied by 100 was designated as the rate of frequency of consulting. The rate due to upper airway diseases increased from year to year; the rate due to cold plus bronchitis increased until 1968, then reached a plateau; and the rate due to asthmatic bronchitis plus bronchial asthma increased until 1966 and then reached a plateau. When the rates of frequency of consulting physicians for several respiratory diseases in Yokkaichi were correlated to the concentration of SO₂ in air, a positive correlation was shown with bronchial asthma. After normalizing the rate due to bronchial asthma in Kusunokimachi, there was a positive correlation between SO₂ concentration in air and the rate of frequency of consulting physicians for bronchial asthma.

51853

APTIC NO. 75393

Rapoport, Z. Z., M. A. Sarova, and V. A. Razmanov

ALLERGY IN THE CASE OF PLATINOSIS. (Allergiya pri platinozakh). Gigiena Truda i Prof. Zabolevaniya, no. 1:10-14, 1974. 8 refs. Translated from Russian, 9p.

Immunological examinations of 175 persons occupationally exposed to platinum salts for prolonged periods are reported. Clinical manifestations of platinosis such as bronchial asthma, allergic rhinitis, eczema, itching, dermatitis, urticaria, and conjunctivitis were observed in 48.5% (85 patients) of the cases. Allergic reactions proved positive in 51.5% of the cases (65% for patients exhibiting symptoms of platinosis and 39% for those not manifesting platinosis). The sensitization appeared to be of a specific nature and depended on the exposure time and mode of contact (inhalation or skin contact). Antiallergic treatments which included removal of the patient from contacts with allergens as well as the administration of antihistaminic drugs and corticoid hormones were beneficial.

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APTIC NO. 73795

Rokushika, T. and M. Aoyama

RELATIONSHIP BETWEEN DAMAGES DUE TO PHOTOCHEMICAL SMOG IN NAGOYA AND THE WEATHER CONDITIONS. (*Nagoya ni okeru kokagaku sumoggu higai to kisho no kankei*). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):316, Nov. 1974.

The relationship between health damage due to photochemical smog in 1973 and weather conditions and oxidants in Nagoya City was analyzed. Almost all of the patients were mailmen who were driving motorcycles with resulting symptoms of eye-disturbance. The onset of damage occurred mainly between 10 am and noon. The temperature was always 25 C. The damage occurred under wind speed of less than 4 m/sec, with many cases under 2 m/sec. The number of patients was small at less than 30 C, and when the daily difference of temperature was larger than 12 C and relative humidity was more than 80% the damage seldom occurred. The frequency of oxidant concentration more than 0.06 ppm on the days of damage occurrence was larger than that on the days when no damage occurred.

51855

APTIC NO. 75309

Roshchin, A. V.

THE TOXICOLOGY OF METALS AND THE PREVENTION OF OCCUPATIONAL TOXIC EFFECTS. (*Toksikologiya metallov i profilaktika professional'nykh otravleniy*). Zh. Vses. Khim. Obshchestva, 19(2):186-192, 1974. 21 refs. Translated from Russian. Translation Consultants, Ltd., Arlington, Va., 23p.

The toxic effects of metal compounds are discussed in relation to occupational exposure. There is a general tendency towards increased toxicity with increasing atomic weight of the metal. Laboratory animal experiments indicate that the most toxic metals are mercury, uranium, indium, cadmium, copper, thallium, platinum, and silver. The toxic effect of metal salts is usually due to the action of the cation, while the toxic action of metal oxides is determined primarily by their solubility in water and biological media. Metal oxides are generally less toxic than their salts. All metals exert their toxic effects primarily through the medium of protein metabolism. The earliest and most sensitive indicator of metal poisoning is the nonspecific general reaction of dysproteinemia involving the alpha, beta, and gamma fractions of blood proteins. Preventive measures in connection with occupational exposures include periodic and preliminary medical examinations and nutritional measures such as the systematic taking of vitamins.

51856

APTIC NO. 73863

Sanotskii, I. V.

PREVENTION OF COMPLEX CHEMICAL EFFECTS ON MAN. THE COMPLEX PROBLEMS OF MEDICINE, ECOLOGY, CHEMISTRY, AND TECHNOLOGY. (*Preduprezhdenie vrednykh khimicheskikh vozdeystviy na cheloveka - kompleksnaya zadacha meditsiny, ekologii, khimii i tekhniki*). Text in Russian. Zh. Vses. Khim. Obshchestva Im D. I. Mendeleeva, 19(2):125-134, 1974. 89 refs.

The chemical, technological, toxicological, and ecological problems of air and water pollution and its prevention in the era of the rapid growth of the chemical industry are discussed. Full-scale production of new chemical substances is permitted following the detailed elaboration of the technological process and preliminary toxicological assays of the substance to be produced and of substances generated in the technological process in short-term animal experiments. The complete toxicological assessment of new chemical products involves chronic experiments on animals and the study of the possible combined effects of several substances. Depending on the results of these toxicological studies, the replacement of certain substances by less toxic or nontoxic ones and modification of the technological process may be required. The remote

effects, such as effects on the cardiovascular and nervous system, on reproduction, as well as carcinogenic and genetic effects, are studied under natural conditions parallel with epidemiological surveys. The establishment of maximum allowable concentrations and doses is one of the most essential steps of the toxicological assessment procedure. Even variations of certain parameters within the physiological limits under the influence of harmful substances are rated as harmful.

51857

APTIC NO. 74045

Schueneman, J.

PUBLIC HEALTH SIGNIFICANCE OF ADDING METHYLCYCLOPENTADIENYL MANGANESE TRICARBONYL (MMT) TO GASOLINE. Preprint, Ethyl Corp., Baton Rouge, La., Medical Dept., 8p., Sept. 1974. 26 refs.

The addition of the antiknock additive methylcyclopentadienyl manganese tricarbonyl (MMT) to unleaded gasoline is discussed in terms of its public health significance. The additive is almost completely converted in the exhaust to manganese tetroxide, and the use of MMT at a concentration of 0.033 g/l gasoline is expected to increase the median airborne manganese concentration by about 0.05 micrograms/cu m. This amount appears to be insignificant compared with the amount of manganese ingested in food. Laboratory studies involving the exposure of rats and hamsters to the exhaust products of gasoline containing MMT at levels (50-150 micrograms/cu m) far above any expected airborne concentration reveal no effects due to the manganese exhaust products. Although increased rates of respiratory disease in children living near ferromanganese plants are reported at estimated exposures of 10-260 micrograms/cu m, it is not certain that manganese is the cause of the respiratory complaints since the exhaust from such plants also contains other materials like silica and other metal oxides. Chronic animal inhalation studies are currently underway.

51858

APTIC NO. 73789

Shingu, H., I. Tanaka, S. Kusumoto, T. Nakajima, M. Watanabe, and M. Sugiyama

EFFECTS OF OZONE ON VITAL RESISTANCE AGAINST INFECTION. (*Kansen teikosei ni taisuru ozon no eikyo*). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):332, Nov. 1974.

Results of an investigation of the effects of ozone on the mobility, the phagocytotic activity, and interferon production of alveolar macrophages and tonsillar lymphocytes are reported. Macrophages were collected from rabbits exposed for 3 hr to 1-5 ppm of ozone. Newcastle disease virus (Miyaji strain) was used for inducing interferon production, and the titration of interferon was done by determining the inhibition of the cytopathic effect on Vascular stomatitis virus in L- or RK-13 cells. The phagocytotic activity to 3H-thymidine labelled Escherichia coli decreased just after and 24 hr after the exposure. The mobility of macrophages was inhibited just after the exposure, but it was restored 24 hr after exposure. The interferon production dropped to 1/4 of the control. After exposing a suspension of human tonsillar lymphocytes to ozone, both the interferon production caused by Newcastle disease virus-infection and the induction of DNA synthesis of lymphocytes were clearly reduced.

51859

APTIC NO. 74083

Tada, Manabu

ARSENIC POLLUTION IN SASAGAYA REGION AND ITS EFFECT ON HUMAN BODIES. (*Sasagaya chiku no hiso osen to jintai eikyo*). Text in Japanese. Kankyo Eisei (Environmental Sanitation), 21(9):6-13, 1974.

An investigation of health problems from arsenic poisoning was conducted from 1972 to 1973 among residents near the abandoned Sasagaya Mines, in Shimane Prefecture, Japan.

The Sasagaya Mines have a history dating back 700 years, and were in production until 1949. A survey of abandoned mines in 1973 showed piles of powdery waste ore and As residue in the abandoned refinery furnaces, which would be dissolved by rain. The As content of soil, water, and regional produce was measured in 1970. Well-water from the area close to the mines had a maximum As concentration of 0.193 ppm. Arsenic concentrations in rivers and streams ranged from 0-0.220 ppm. Soil samples at a point 6 km from the refinery contained 85 ppm arsenic. The As content of produce (greens and root vegetables) was not particularly high. Rice, grown with special techniques adapted to the region, had an average As content of 0.167 ppm. Arsenic concentrations in dust from old houses ranged from 16.4-218 ppm, and showed air pollution patterns. In 1972 and 1973, health examinations were given to former mine workers, their families, and those who may have been affected by As pollution of air or water. About 2000 persons (3/4 adults, 1/4 children) were screened, and case histories were taken. Twelve fairly definite cases of chronic As poisoning and 6 suspected cases were found. Electromyculograms (EMG) were taken on 1393 subjects from the As-polluted Sasagaya region, and 1393 controls from non-polluted farming areas. Two to five times as many cases of sensory impairment of the hands and feet occurred among all ages, males and females, from Sasagaya. In these cases, skin appearance was not always symptomatic of As poisoning. Certification as an As-pollution victim will be possible if the person lived in a heavily As-polluted region, had a history of long-term exposure to arsenic trioxide, and exhibits chronic As poisoning symptoms by physical appearance or multiple neuritis.

51860

APTIC NO. 73908

Takizawa, Y.

ENVIRONMENTAL POLLUTION AND CONGENITAL MALFORMATION. (Kogai to Senten-ijo). Text in Japanese. *Senten Ijo (Congenital Anomalies)*, 14(3):171-172, 1974.

The effect of air pollution on human beings inducing acute and chronic poisoning, carcinogenesis, mutagenesis, shortening of life, and depression of physiological function, is discussed with special reference to the high susceptibility of the fetus to exogenous factors. The carcinogenicity and mutagenicity of 3,4-benzopyrene is described and the higher frequencies of stillbirth and congenital malformations of newborns in Yokkaichi City are noted.

51861

APTIC NO. 71556

Taushan, M. D.

MICROELEMENTS IN LEAD INTOXICATIONS. (*Mikroelementy pri svintsovykh intoksikatsiyakh*). Text in Russian. *Vrachebnoye Delo (Kiev)*, no. 1:122-124, 1974.

Relationships between the concentrations of iron, copper, manganese, zinc, cobalt, nickel, chromium, and lead in blood were studied in healthy blood donors, in healthy workers occupationally exposed to lead, and in patients with lead poisoning. The blood iron concentration was lowest in healthy workers and especially in patients with lead poisoning. The lead concentration in the blood was lowest in blood donors, and highest in lead poisoning patients. High copper concentration was often associated with pains in the limbs and headache. Moderate correlation was established between the lead and zinc concentrations in blood donors and lead poisoning patients. There was no statistically significant differences in the manganese, cobalt, nickel, and chromium concentrations among the three different groups.

51862

APTIC NO. 73802

Ueshima, I., M. Tsuda, Y. Takemura, T. Sakata, N. Mizukoshi, and Y. Tsunetoshi

INVESTIGATION OF INHABITANTS HEALTH UNDER AIR POLLUTION, IN OSAKA PREFECTURE. (*Osaka fuka ni okeru taiki osen no jumin kenko chosa*). Text in Japanese. *Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution)*, 9(2):320, Nov. 1974.

The results of an epidemiological investigation of chronic bronchitis in 15,579 inhabitants older than 40 in the south part of Suita City (neighboring Osaka City) are reported. The results were normalized by smoking and age. The morbidity of chronic bronchitis was 7.4% in males, 3.5% in females and 5.4% in total which is lower than in Nishiyodogawa-ward, Osaka City and in the south part of Toyonaka City. When the area was subdivided and the data were combined with that of the south part of Toyonaka City, it was found that the morbidity was reduced as the distance from the Nishiyodogawa-ward and Amagasaki City increased. The rate of obstructive disturbance of the patients of chronic bronchitis was 16.6%, almost the same as the values hitherto obtained.

51863

APTIC NO. 71536

Wehrle, Paul F. and Douglas I. Hammer

SUMMARY REPORT: ILLNESSES OF CHILDREN.

Preprint, American Medical Association, Chicago, Ill., 19p. 1974 (?). 25 refs. (Presented at the Air Pollution Medical Research Conference, 1974 (?).)

A tabulation of the health effects of specific air pollutants on children is presented based on a literature review of more than 100 investigations prior to 1970. Clinical and laboratory findings as well as the pollutant source are summarized for the following substances: fluorine, lead, arsenic, asbestos, silicates, fatty acids, carbon monoxide, chloroprene, sulfur dioxide, hydrogen sulfide, carbon disulfide, hydrocarbons, sulfuric acid, and particulate matter. A brief review of epidemiological findings associated with major air pollution episodes is also presented.

51864

APTIC NO. 74126

Yamaoka, K., M. Mori, N. Shinohara, M. Oseto, A. Kitamura, A. Yano, C. Komoda, N. Yasunaga, and S. Soda

RESULTS OF EXAMINATION OF PATHOGENIC MICROORGANISMS PERSISTING IN PHARYNX OF INHABITANTS IN AIR POLLUTED AND NON-POLLUTED AREAS IN EHIME PREFECTURE. (*Ehimeken no taiki-osen chiiki oyobi hi-osen chiiki ni okeru jumin no into-jogai byogen beseibutsu no kensaku*). Text in Japanese. *Ehime-ken Eisei Kenkyusho Nenpo (Annu. Rep. Ehime Prefect. Inst. Public Health)*, no. 35:33-36, 1974. 1 ref.

The relationship between air pollution and pathogenic microorganisms in the pharynx of inhabitants of polluted and non-polluted areas of Ehime Prefecture was investigated. The only viruses identified were one case of mumps and three cases of influenza B/73 in infant patients. *Candida albicans* was observed in 15% of the people examined, although its relationship to disease was not evident. Hemolytic streptococcus was frequently identified in patients and healthy inhabitants; however, its type-classification was not performed and its pathogenic significance was not established. The effect of air pollution on pharyngeal infection due to viruses, fungi, and bacteria was not established.

51865

APTIC NO. 71568

Yankel, A. J. and I. Vonlindern

PROCEDURES EMPLOYED FOR A STUDY OF LEAD IN DUST, SOIL AND THE AMBIENT AIR. Preprint, Air Pollution Control Assoc., Pittsburgh, Pa. 29p., 1974. 6 refs. (Presented at the Air Pollution Control Association, Pacific Northwest International Section Meeting, Boise, Idaho, Nov. 17-19, 1974.)

Soil, air, and vegetation analyses for lead contamination were conducted along with blood lead screening of children living in Idaho's Silver Valley Region, an area of extensive mining and lead/zinc smelting operations. Sources contributing to lead contamination in the Valley were: smelting operations (50-70% of the total lead), fugitive sources (20-70%), milling operations (5-15%), ore and concentrate transportation (5-60%), and soil and dust (0-2%). The primary source of airborne lead con-

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tamination in the valley appears to be the smelting operation which emits between 20-100 tons of lead/mo. Average lead levels in the contaminated area were as high as 6700 ppm for soil, 1200 ppm for vegetation (grass), and 12,000 ppm for house dust. Blood lead levels of over 50 micrograms/100 ml blood were observed in as high as 24.7% of the children tested in some areas of the valley. The blood lead levels followed the same general pattern as air, soil, and vegetation samples, although no obvious correlation was observed between environmental lead levels and blood lead levels in children on an individual basis.

51866

APTIC NO. 74195

Yokoyama, E.

SURVEY OF THE EFFECT OF AIR POLLUTION UTILIZING SPECIAL POPULATIONS. (Tokushu shudan o shiyo shitenno taiki osen eikyo no chosa). Text in Japanese. Igaku no Ayumi (Prog. Med), 90(13):952, Sept. 1974. 4 refs.

The use of special populations to assess the relationship between air pollution and specific health disorders is discussed. Typical populations for such studies include schoolchildren and specific occupational groups. Socio-economic factors are standardized for a given population to avoid bias.

51867

APTIC NO. 73801

Yoshida, K., M. Kitabatake, M. Imai, and M. Murata

RELATION BETWEEN FREQUENCY OF CONSULTING PHYSICIAN ON RESPIRATORY DISEASES AND INDEX OF AIR POLLUTION. (Kokyuki shikkan jushin to osen shiyo tonon kaneki). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):319, Nov. 1974.

In order to examine the effect of short term variation of air pollution on the trend of diseases, a study was carried out to see the relationship between the daily variation of concentration of sulfur dioxide in air and floating dust and the frequency of consulting physicians on respiratory diseases of the inhabitants of Yokkaichi who live in a circle with the monitoring center as a center and a diameter of 1 km. The study was done by computer. The representative results were: the correlation was highest between the frequency and the maximum and average concentration of SO₂ of the day before and no correlation was found between the frequency and floating dust. The relationship of the frequency to other pollutants such as nitric oxide, nitrogen dioxide, and oxidants are now under examination.

51868

APTIC NO. 73912

Meguro Ward Office, Tokyo (Japan)

AIR POLLUTION. (Taiki osen). Text in Japanese. In: Environmental Nuisance in Meguro Ward 1974, p. 19-23, Oct. 1974.

In the Meguro ward of Tokyo, the total number of officially acknowledged respiratory patients is 284, consisting 81 and 41 infantile cases of bronchial asthma and asthmatic bronchitis; 2, 130 and 14 primary schoolchildren with chronic bronchitis, bronchial asthma and asthmatic bronchitis; 15 middle school pupils with bronchial asthma at the end of March 1974. Air pollution related cases of bronchial asthma, chronic bronchitis, pulmonary emphysema, lung, cancer, chronic conjunctivitis and chronic laryngopharyngitis from one area with a high carbon monoxide concentration and another area with a lower carbon monoxide concentration are discussed in relation to the change of the disease states.

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APTIC NO. 73927

Kanagawa Prefectural Office (Japan)

STUDIES ON THE BIOLOGICAL EFFECTS OF CAUSAL SUBSTANCE OF PHOTOCHEMICAL AIR POLLUTION. (Kokagaku kagai genin busshitsu no seitai no oyobusu eikyo no kenkyu). Text in Japanese. In:

Kanagawa Prefectural Public Nuisance White Paper. p. 326-327, Dec. 1974.

Acrolein is a powerful causal agent for photochemical air pollution exists in autoexhaust and atmospheric air; however, its effects were only recognized at very high concentrations, and nitrates such as methyl nitrate detected in atmospheric air showed no conspicuous physiological action alone. When rabbits were exposed to a gaseous mixture of acrolein and methyl nitrate, conspicuous changes were observed on blood pressure, respiratory frequency, and movement of eye-lid, even at lower concentrations than exposure only to acrolein. Complex pollution has a stronger physiological action, even the single components are generally weaker.

51870

APTIC NO. 74031

Environmental Protection Agency, Corvallis, Oreg., National Ecological Research Lab.

THE BIOENVIRONMENTAL IMPACT OF AIR POLLUTION FROM FOSSIL-FUEL POWER PLANTS (FINAL REPORT). Program Element 1AA006, ROAP/Task 21BCI-02, Rept. EPA-660/3-74-011, 23p., Aug. 1974. 21 refs.

Studies of the ecological effects of air pollution from coal-fired power plants are reviewed in an attempt to generate methods for predicting bioenvironmental effects of air pollution before damage is sustained. Topics covered include: the monitoring of particulates, sulfur dioxide, nitrogen oxides, ozone, hydrocarbons, carbon monoxide, and meteorological variables; ecosystem and diffusion modeling; laboratory experiments designed to measure and evaluate the responses of plants and animals to air pollution challenge; and the use of remote sensing to investigate major ecosystem resources and provide information on large-scale ecosystem changes.

51871

APTIC NO. 74120

STUDIES ON THE HUMAN EFFECTS OF ENVIRONMENTAL POLLUTION. PART 2. EFFECTS OF NITROGEN MONOXIDE ON HUMAN BODY.

(Kogaino jintai eikyo ni kansuru kenkyu. 2. issanka chisso no jintai eikyo ni kansuru kenkyu). Text in Japanese. Osaka Furitsu Koshu Eisei Kenkyusho Nenpo (Annu. Rep. Osaka Prefect. Inst. Pub. Health), p. 67-68, 1974.

Determinations of nitric oxide-hemoglobin by electron spin resonance revealed that the mechanism of formation of NO-hemoglobin is not necessarily the same in rabbits, rats and mice. The formation mechanisms of NO-hemoglobin and carboxyhemoglobin were compared and found to be different. Histological examinations of subcutely NO-exposed mice revealed anemic changes in the brain and in the heart which were susceptible to oxygen deficiency.

51872

APTIC NO. 74127

ON THE CELLULOTOXICITY OF PHOTOCHEMICAL OXIDANT. (Kokagaku oxidant no saibo-dokusei). Text in Japanese. Osaka-furitsu Koshu Eisei Kenkyusho Nenpo (Annu. Rep. Osaka Prefect. Inst. Pub. Health), no. 23, 1974.

Interferon production by rabbit alveolar macrophage exposed to 5 ppm ozone for 3 hr in vivo was completely inhibited and was decreased to 0.5 and 0.25 that of controls after 3 hr of exposure to 3 ppm and 1 ppm, respectively. The dose response curve between the concentration of ozone and the production of interferon was not determined. The alveolar macrophage lost a part of its phagocytic activity to tritium-labelled Escherichia coli after exposure to ozone, suggesting that ozone can cause a decrease in resistance to infection.

51873

51873

APTIC NO. 74179

STUDIES ON THE HUMAN EFFECTS OF ENVIRONMENTAL POLLUTION. PART 1. STUDY ON THE HUMAN EFFECTS OF PHOTOCHEMICAL SMOG. (*Kogai no jintai eikyo ni kansuru kenkyu. 1 kokagaku smogu no jintai eikyo ni kansuru kenkyu*). Text in Japanese. Osaka Furitsu Koshu Eisei Kenkyusho Nenpo (Annu. Rep. Osaka Prefect. Inst. Pub. Health), p. 67, 1974.

Increases in leukocyte number are observed in mice exposed to ozone. Similar increases are also observed in humans exposed to photochemical smog. The lower limit of ozone exposure required for the increased leukocyte reaction in mice is 3 ppm for 3 hr. Leukocyte count is not considered, however, as an adequate index of the effect of oxidant exposure.

51874

APTIC NO. 74180

STUDIES ON THE HUMAN EFFECTS OF ENVIRONMENTAL POLLUTION PART 3. EXPOSURE EXPERIMENTS OF ANIMALS OUTDOOR. (*Kogai no jintai eikyo ni kansuru kenkyu 3. Yagai bakuro jikken*). Text in Japanese. Osaka Furitsu Koshu Eisei Kenkyusho Nenpo (Annu. Rep. Osaka Prefect. Inst. Pub. Health), p. 68, 1974.

Histological examinations of mice exposed to the outdoor atmosphere of Osaka, Japan for two years are reported. Proliferation of mucosal epithelium of the bronchus and pulmonary chronic bronchitis are observed and support the existence of many patients with obstructive respiratory disease due to air pollution in Osaka.

51875

APTIC NO. 74209

Osaka Prefectural Inst. of Public Health (Japan).
Environmental Health Lab.

ON THE HISTOPATHOLOGICAL ALTERATION OF RESPIRATORY SYSTEM OF MOUSE EXPOSED RESPECTIVELY TO PHOTOCHEMICAL OXIDANT AND AUTOEXHAUST. (*Kokagaku sumogu ni jintai eikyo chosa*). Text in Japanese. Kokagaku sumogu ni kansuru chosakenkyu (Res. Rep. Photochem. Smog), no. 1:283-291, Feb. 1974.

Mice aged 304 weeks were exposed to artificially generated photochemical oxidant (total oxidant concentration of 0.1-0.15 ppm) and to autoexhaust (40-60 ppm of carbon monoxide 0, 2-3 hr/day, 5 days/week, for 1 mo). No differences in appearance or body weight were observed between those mice exposed and those not exposed. Some histological alterations of the airway mucosa, however, were recognized. The main alteration, the reactive proliferation of bronchial epithelial cells, appeared mainly on relatively large bronchi of animals exposed to photochemical oxidant and mainly on peripheral bronchi of animals exposed to autoexhaust.

51876

APTIC NO. 75352

Meloy Labs., Inc., Springfield, Va., Biological Products Div.

AIR POLLUTION EXPOSURE AND IMMUNOGLOBULIN LEVELS (FINAL REPORT). Environmental Protection Agency Contract 68-02-0586, Program Element 1AA005, Rept. EPA-650/1-75-005, 19p., March 1974. 4 refs.
NTIS: PB 242138/AS

Sera obtained from 517 smokers and 147 nonsmokers among army recruits in the Chicago area were tested to determine whether air pollution affects immunoglobulins to a different degree in smokers than in nonsmokers. Single radial immunodiffusion was used to quantitatively determine the levels of immunoglobulin A, G, M, and C3 and revealed no significant differences between the two groups when comparisons were statistically analyzed by geographic location. Significant differences were also not observed between smokers with cough and phlegm and those without such symptoms. (Author abstract modified)

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AIR POLLUTION ABSTRACTS, OCTOBER 1975

1973

51877

APTIC NO. 75323

Pyatnitskaya, L. V., V. A. Volodchenko, N. M. Vasilenko, V. V. Manfanovskiy, and Y. V. Prilipskiy

DATA FOR ESTABLISHING THE MAXIMUM PERMISSIBLE CONCENTRATION OF BETA-NAPHTHOL IN THE AIR OF INDUSTRIAL AREAS. (*Materialy k obosnovaniyu predel no dopustimoy kontsentratsii naphthola v vozdukhie proizvodstvennykh pomeshcheniy*). *Gigiena i Sanit.*, 38(10):15-18, 1973. 4 refs. Translated from Russian. Scitran Scientific Translation Service, Santa Barbara, Calif., 7p.

Data from animal toxicity experiments and observations of occupational exposures are used to arrive at a maximum permissible concentration for beta-naphthol, a hydrocarbon of the naphthalene series that is used in the textile and dyeing industry and in the production of fungicides. Occupational exposures to the compound can result in lesions of the urinary organs in the form of chronic cystitis and dysuria, chronic gastritis and hepatitis, nervous system disorders, upper respiratory tract irritation, and vascular asymmetries. Animal toxicity experiments indicate an average threshold concentration of 0.45 mg/cu m; toxic and subtoxic concentrations appear to be around 10.0 and 1.35 mg/cu m, respectively. A concentration of 0.1 mg/cu m is recommended as the maximum permissible airborne level for working areas.

51878

APTIC NO. 75389

Sander, J.

THE SIGNIFICANCE OF NITRATE, NITRITE AND AMINES IN WATER FOR THE FORMATION OF CARCINOGENIC N-NITROSO COMPOUNDS. (*Die Bedeutung von Nitrat, Nitrit und Aminen im Wasser fuer die Bildung krebserzeugender N-Nitrosoverbindungen*). *Schriftenreihe Ver.-Wasser-Boden-Lufthyg.* (Berlin), no. 40:67-78, 1973. 19 refs. Translated from German, 16p.

The role of nitrates, nitrites, and amines in the formation of carcinogenic nitroso compounds is reviewed. Nitrates, upon being reduced to nitrites in drinking water, food, and in the human body, are capable of causing the nitrosation of amines or amides. Nitrogen trioxide is generally the nitrosation agent under physiological conditions. The pH value at which nitrosation proceeds with maximum speed is in the vicinity of 3 for simple dialkyl amines and trialkyl amines. Several amino acids, which are secondary amines, undergo maximum nitrosation at a pH of 2. Formaldehyde and some other aldehydes are capable of increasing nitrosamine formation, particularly in the neutral and slightly alkaline range. Airborne pollutants such as the oxides of nitrogen are capable of being converted in the body to nitrites which in turn are converted into carcinogenic nitroso compounds. Nitrites in tobacco smoke pose the same potential hazard.

51879

APTIC NO. 73873

Stanton, M. F.

SOME ETIOLOGICAL CONSIDERATIONS OF FIBRE CARCINOGENESIS. In: *Biological Effects of Asbestos*. Lyon, France, International Agency for Research on Cancer, 1973, p. 289-294. 6 refs.

The carcinogenicity of various structural forms of asbestos, fiber glass, and aluminum oxide was examined by applying (open thoracotomy) three materials to the left pleural surface of 30, 11- to 14-week old, female Osborne-Mendel rats in single standard 40 mg doses. Carcinogenicity was related primarily to fibrous structure rather than to physicochemical properties. Fibers below 2.5 micron in diameter and between 10 and 80 micron in length were particularly carcinogenic, based on a comparison of the dimensional distribution of fibers in asbestos and glass samples producing high and low tumor incidence. (Author summary modified)

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51885

51880

APTIC NO. 75394

Visil yeva, Y., and A. A. Orlova

THE ROLE OF AUTOALLERGY IN THE CLINICAL APPEARANCE OF BERYLLIOSIS. (*Rol autoallergii v klinicheskoi proyavlenii berillioza*). *Gigiena Truda i Prof. Zabolevaniya*, no. 12:27-31, 1973. 5 refs. Translated from Russian, 9p.

Immunological studies of persons occupationally exposed to beryllium are reported, with emphasis on the different autoimmune processes involved in granulomatous versus interstitial berylliosis. The granulomatous form is a serious systemic disease with a higher titer of antinuclear antibodies and is characterized by a high level of antipulmonary, anticardiac, antihepatic, and antithyroid antibodies. The interstitial form is a local pulmonary process with a prolonged latent period and a sparse complex of symptoms. The antibodies are directly only against the antigenic components of the lungs, and the autoallergy is the only phenomenon that accompanies the chronic pulmonary process. Antibody assay can be used to differentially diagnose each form of the disease, with the levels of the autoantibodies reflecting the patient's condition and the effectiveness of therapy.

51881

APTIC NO. 74242

Zajusz, Kazimierz, Kornel Ludya, and Stanislaw Kosmider

EFFECTS OF NITROGEN OXIDES UPON DEVELOPMENT OF EMPHYSEMA. (*Rozedmotworcze dzialanie tlenkow azotu*). Text in Polish. *Med. Pracy (Warsaw)*, 24(5):495-500, 1973. 23 refs.

Rats were exposed to nitrogen oxides at a concentration of 4-5 mg/cu m for 4 weeks, 8 hr/day. The exposure resulted in the development of emphysema as indicated by morphological examination and observed changes in static lung susceptibility, residual volume, and total lung capacity. The ratio of residual volume to total lung capacity was 0.39 ± 0.02 after exposure as compared to a control value of 0.29 ± 0.04 .

51882

APTIC NO. 75328

Japanese Society of Public Health

ENVIRONMENTAL HEALTH REPORTS. ENVIRONMENT AND POLLUTION INFORMATION MATERIALS. CADMIUM POISONING. Rept. 24, Sept. 1973. 88 refs. Translated from Japanese. Leo Kanner Associates, Redwood City, Calif., 391p.

Clinical, pathological, and epidemiological research studies of cadmium poisoning and itai-itai disease are reported. Topics presented include: the absorption, accumulation, and excretion of Cd in humans and laboratory animals; the pathology of kidney damage caused by Cd poisoning; the urinary protein patterns of Cd poisoning and itai-itai disease; a Cd screening method involving the measurement of urinary proline via the acidic ninhydrin reaction; occupational exposure to Cd; autopsy results from districts polluted with Cd; the histochemical detection of Cd by the diphenyl thiocarbazid method; surveys of elderly persons with positive urinary protein; the prognosis of residents in cadmium polluted areas and patients with itai-itai disease; therapeutic methods for the control of Cd poisoning and itai-itai disease; and bone changes in people exposed to Cd.

1972

51883

APTIC NO. 74129

Fujino, T., H. Ohima, M. Imai, F. Kawagishi, and K. Tomono

AIR POLLUTION AND MORTALITY IN YOKKAICHI. (*Yokkaichi chiiki no taiki oken to shibo-ritsu ni tsuite*). Text in Japanese. In: *Kogai Chosa Kenkyu Itaku Jigyo Hokkokusho (Report of Entrusted Investigation of Public Nuisance)*, 13p., 1972.

Human mortality statistics for the city of Yokkaichi in 1971 were compared with those from 1961 to 1970 to study the rela-

tionship between air pollution in the area and mortality. Lung cancer and obstructive respiratory disease (bronchitis, bronchial asthma, and pulmonary emphysema) showed a strong correlation with air pollution. The coefficients of correlation between bronchial asthma, pulmonary emphysema, and local concentration of sulfur dioxide showed an increase since 1968. When the mortalities during 11 yr (1961-1971) in polluted areas were compared with those for non-polluted areas of the city, mortality from obstructive respiratory disease began to show significance, especially for bronchial asthma and pulmonary emphysema. There were a significant number of deaths due to bronchial asthma in younger people.

51884

APTIC NO. 73857

Gelboin, H. V., F. J. Wiebel, and N. Kinoshita

MICROSOMAL ARYL HYDROCARBON HYDROXYLASES: ON THEIR ROLE IN POLYCYCLIC HYDROCARBON CARCINOGENESIS AND TOXICITY AND THE MECHANISM OF ENZYME INDUCTION. *Biochim. Soc. Symp.*, no. 34: 103-133, 1972. 50 refs.

Cell cultures from various laboratory animals were used to study the role of microsomal aryl hydrocarbon hydroxylases in polycyclic hydrocarbon carcinogenesis. The induction of the hydroxylase required continuous protein synthesis and proceeded for up to 16 hr after a lag of 35 min. Ribonucleic acid synthesis was required only during an initial period of 30-60 min. Two forms of aryl hydrocarbon hydroxylase were delineated by their sensitivity to inhibition by 7,8-benzoflavone. The AHH in extrahepatic tissues from 3-methylcholanthrene-induced rats was consistently more sensitive to BF than was the AHH from non-induced rats. The AHH enzyme system in the liver, although a detoxification system that converts polycyclic hydrocarbons to either weak or noncarcinogenic compounds, appeared to be also involved in the activation of these compounds to either toxic or carcinogenic metabolites. The carcinogen 7,12-dimethylbenzanthracene formed a covalent linkage to the deoxyribonucleic acid, RNA, and proteins of mouse skin, and this binding was inhibited by BF; 7,8-benzoflavone inhibited DMBA-initiated tumor formation by 50-80%. However, BF showed either no effect or a stimulating effect on benzo(3,4)pyrene-induced tumor formation, suggesting that the role of the vis-a-vis carcinogen activation and detoxification is unique for each hydrocarbon. (Author abstract modified)

51885

APTIC NO. 73706

Jones, Margaret Hubbard

PAIN THRESHOLDS FOR SMOG COMPONENTS. In: *Environment and the Social Sciences: Perspectives and Applications*. J. F. Wohlwill and D. H. Carson (eds.), Washington, D. C., American Psychological Association, 1972, p. 61-65. 2 refs.

Psychophysical experiments designed to predict eye irritation thresholds in relation to measured pollutants in synthetic smog were conducted with 12 pretrained subjects. The mean multiple correlation coefficient of the concentration data was 0.85 for the entire group of subjects, indicating that eye irritation was in large part accounted for by the variables measured. The best single predictor of eye irritation was hydrocarbon decrease (a precursor of formaldehyde concentration) which showed a correlation coefficient of -.66. Formaldehyde concentration was close behind as a predictor of eye irritation with a correlation coefficient of -.64. The mean threshold for the eye irritation formaldehyde was about 10 ppm. Acrolein, another irritating substance found in smog, possessed a threshold value of 0.9 ppm. The formaldehyde and acrolein measured in the artificial smog accounted reasonably well for the eye irritation experienced among the subjects.

135

1971

51886

APTIC NO. 74290

Dorst, Jean

THE ACTION OF POLLUTION ON THE BIOLOGICAL EQUILIBRIUM AND ON HUMANS. (*Actions des pollutions sur les equilibres biologiques et sur l'homme*). Text in French. Bull. Tech Inf., no. 262:655-658, 1971.

The effects of environmental pollution on the equilibrium of the ecosystem and on the human organism are discussed. Air pollution, especially particulates, sulfur dioxide, nitrogen oxides, carbon monoxide, and hydrocarbons, may cause chronic bronchitis, emphysema, cardiovascular disorders, and lung cancer. Fluorine and SO₂ cause plant necrosis. Certain air pollutants exert synergistic effects with other pollutants and generate smog under the influence of solar radiation.

1970

51887

APTIC NO. 73701

Schroeder, Henry A.

AIR QUALITY MONOGRAPHY - MANGANESE. American Petroleum Inst., Washington, D. C., Environmental Affairs, Rept. 70-17, 39p., 1970. 44 refs.

The environmental presence of manganese is reviewed in terms of its natural and man-made sources, its effects on plants, animals, and humans, and its interactions with other constituents of the environment. Airborne manganese is an industrial pollutant that originates from ferromanganese blast furnaces, incinerators, and to a small extent the burning of coal and oil. Potential sources of the metal include organic manganese fuel additives used as smoke-suppressants and antiknock compounds. Airborne manganese catalyzes the oxidation of sulfur and nitrogen dioxides in the presence of water vapor. Manganese is omnipresent in living organisms and is an essential element, particularly for glucose and lipid metabolism in humans. There is no accumulation of manganese in human lung or other tissues with age. Manganese miners exposed to high concentrations of dusts suffer from manganic pneumonia which possesses a high mortality rate. Chronic manganism which mimics Parkinsonism exhibits a high rate of disability. Manganese is of low toxicity, and ambient air levels are probably not directly toxic. Control is desirable, however, because of the metal's interaction with other air pollutants. (Author summary modified)

51888

APTIC NO. 74131

Shishido, M., K. Sugita, H. Hino, T. Saito, M. Kobayashi, T. Suzuki, M. Watabe, N. Sukegawa, and K. Saruta

EFFECTS OF AIR POLLUTION ON INFANTILE HEALTH DISTURBANCE. (*Shoni no kenko shogai ni oyobosu taiki o sen no eikyo*). Text in Japanese. Kanagawa-ken Koshu Eisei Gakkai-shi (Bull. Kanagawa Prefect. Pub. Health Assoc.), no. 17:32, March 1970.

An epidemiological survey of the effects of air pollution in respiratory diseases allergic symptoms, and functional disturbances in children living in Yokohama City was performed. The city was divided into five areas corresponding to the airborne sulfur trioxide concentration: less than 0.3, 0.3-0.5, 0.5-1.0, 1.0-1.5, and more than 1.5 mg SO₃/day/100 cm lead oxide. No relationship was found between SO₃ concentrations and complaints of colds. Complaints of sore throat and eye disease increased with increasing SO₃ concentration. Complaints of allergies, sore throat, and eye irritation were especially significant in the most highly polluted areas.

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1969

51889

APTIC NO. 75395

Arutyunov, L. I.

EFFECT OF NICKEL AS A TRACE ELEMENT ON THE ACTIVITY OF CYTOCHROME OXIDASE AND SUCCINATE DEHYDROGENASE IN VARIOUS ORGANS. (*Vliyaniye nikelya kak mikroelementa na aktivnost tsitokhromoksidazy i suksindegidrogenazy v razlichnykh organakh*). Izv. Akad. Nauk Turkm. SSR, Ser. Biol. Nauk, no. 2:79-82, 1969. 5 refs. Translated from Russian, 9p.

The effect of peroral nickel administration on the activity of cytochrome oxidase and succinate dehydrogenase in various organs of the guinea pig is discussed. Daily peroral administration of nickel chloride solutions (0.5 micrograms/kg/day) over a period of from 5-7 days increases the activity of cytochrome oxidase and succinate dehydrogenase in the subcortical part of the brain, the liver, and the cortex of the kidneys. Doses of 20 micrograms/kg increase the activities of the two enzymes in muscles (zone of biotic activity). Doses of 32 mg/kg and 1.28 g/kg result in the inhibition of both enzymes in the kidney cortex and the inhibition of cytochrome oxidase in the liver and spleen; cytochrome oxidase activity is increased in the muscles (zone of toxic pharmacological activity). The maximum biotic effect of nickel is observed in the kidneys and muscles, and the metal's maximum toxic effect occurs in the kidneys and in the spleen. Nickel chloride may act either as an activator or an inhibitor of cytochrome oxidase and succinate dehydrogenase, depending on the dose used. (Author conclusions modified)

1968

51890

APTIC NO. 75306

Miyakawa, T., M. Deshimaru, S. Sumiyoshi, A. Teraoka, N. Udo, and K. Miyakawa

ELECTRON MICROSCOPIC STUDIES ON EXPERIMENTAL MINAMATA DISEASE - CHANGES CAUSED BY LONG-TERM ADMINISTRATION OF A SMALL AMOUNT OF ORGANIC MERCURY COMPOUND. (*Jikkentenki minamatabyo no denshi kenbikyogakuteki kenkyu*). Kumamoto Univ. (Japan), Dept. of Medicine, 1968 (?). 13 refs. Translated from Japanese. Scitran Scientific Translation Service, Santa Barbara, Calif., 15p.

The effect of chronic, peroral, organic mercury administration (0.3 mg daily for 90 days) on the brain tissue of Wistar rats was studied with electron microscopy. Damage to granular cells of the cerebellum was observed in the form of the loss of small organs in the cells and changes in the pattern and content of nuclear material. Changes in mitochondria were observed during the initial stage of cell modification; this was in contrast to previous findings obtained after acute mercury exposure experiments using comparable overall mercury dosages.

1967

51891

APTIC NO. 75390

Joesch, W. and U. C. Dubach

INFLUENCE OF DIURESIS ON ENZYMURIA. (*Einfluss der Diurese auf die Enzymurie*). Clin. Chim. Acta, vol. 15:325-330, 1967. 7 refs. Translated from German, 10p.

The urinary enzymatic activities of lactic dehydrogenase, alkaline phosphatase, and arylamidase were determined for healthy adults and albino Wistar rats in states of diuresis and antidiuresis to investigate the effects of diuresis state on urine enzyme determinations used for clinical or diagnostic purposes. The tests showed similar activity values for the adult humans and rats. Enzyme activity per milliliter of urine was greater in antidiuresis than during maximal diuresis, while total enzyme activity per unit time was greater during diuresis. Enzyme activity/ml was not inversely proportional to urine volume as is the case for concentrations of a dissolved sub-

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stance in a solution. Normal values for activity/ml and total activity for healthy adults in the state of average diuresis appear to be surpassed during antidiuresis or maximal diuresis; thus the state of diuresis must be considered when urinary enzyme determinations are used for diagnostic evaluations.

1965

51892

APTIC NO. 75322

Alekseyeva, O. G.

STUDY OF THE CAPACITY OF BERYLLIUM COMPOUNDS TO CAUSE DELAYED TYPE ALLERGY.

(Izucheniye sposobnosti soyedineniy berilliya vyzvat allergiyu zamedlennogo tipa). *Gigiena Truda i Prof. Zabolevaniya*, vol. 9:20-25, 1965. 12 refs. Translated from Russian. Translation Consultants, Ltd., Arlington, Va., 12p.

The capacity of beryllium compounds to cause delayed type allergic reactions of the type used in the Curtis test to diagnose berylliosis was studied in guinea pigs. Subcutaneous or intradermal administrations of beryllium oxide or beryllium chloride were capable of causing such reactions in the test animals. The allergy was passively transmitted via the lymph cells of sensitized animals; it was not transmitted via the blood serum. An analogous hypersensitivity of the skin also occurred following nonspecific changes in the immunological condition of the animals. Only small quantities of beryllium chloride can be employed to bring about allergic reactions, since the compound produces primary toxic effects on the skin. (Author conclusions modified)

51893

APTIC NO. 73699

American Industrial Hygiene Assoc.

ARSINE (HYDROGEN ARSENIDE, ARSENIURETTED HYDROGEN). *Am. Ind. Hyg. Assoc. J.*, vol. 26:438-441, 1965. 21 refs.

A toxicological review of arsine is presented. Chronic exposure to low concentrations (less than 0.5 ppm) may result in jaundice and hemolytic anemia. Acute exposure results in a delay of symptoms, with the first indication of arsine intoxication being the passage of dark red urine usually 4-6 hr after exposure. This sign of intoxication is followed by abdominal or back pain and anuria. Although the primary effect of AsH₃ is the destruction of red blood cells, pulmonary edema is also encountered from severe exposures. Arsine is not used industrially, though its evolution may occur during metal pickling operations when the metal contains arsenic, during metal dressing operations, and as a result of exposing any inorganic arsenic compound or solution to nascent hydrogen. The recommended maximal atmospheric concentration (8 hr) is 0.05 ppm (by volume). The atmospheric concentration immediately hazardous to life is probably greater than 70 ppm. Persons suffering from overexposure should be removed immediately from the contaminated atmosphere, placed in bed, and provided with medical care promptly. Both symptomatic and supportive therapy are necessary as in other types of acute hemolytic anemia.

1956

51894

APTIC NO. 75391

Matantseva, Y. I.

THE STATE OF THE RESPIRATORY ORGANS IN WORKERS EXPOSED TO PENTOXIDES OF VANADIUM.

(K voprosu o sostoyanii organov dikhaniya u rabochikh soproisoyazhennykh s pylytskuyu vanadiya). Preprint, Inst. of Labor Hygiene and Occupational Pathology, Sverdlovsk (USSR). 1956 (?). Translated from Russian, 9p. 13 refs.

Electrometallurgical workers exposed to vanadium pentoxide dusts and vapors for periods ranging from 1-12 yr were examined for possible respiratory damage. The majority of sub-

jects complained of various upper respiratory tract problems which included unpleasant sensations in the nose, hoarseness, coughing, and burning, dryness, and tickling in the throat. Lung examinations revealed acute and chronic bronchitis, peribronchitis, and isolated cases of acute toxic pneumonia and pneumosclerosis. Almost all of the workers exhibited lung hyperventilation and an elevated basal metabolic rate. Ascorbic acid treatments were successful in normalizing the latter condition in some cases. (Author conclusions modified)

1950

51895

APTIC NO. 75332

Mogilevskaya, O. Y.

THE CHARACTERISTICS OF MOLYBDENUM AS AN INDUSTRIAL POISON. (K kharakteristike molibdena kak promyshlennogo yada). *Gigiena i Sanit.*, 15(12):18-22, Dec. 1950. Translated from Russian. Scitran Scientific Translation Service, Santa Barbara, Calif., 7p.

White rats were exposed to the dusts of various molybdenum compounds to assess the occupational hazard associated with acute and chronic human exposure to such dusts. Single 1-hour exposures to 25-30 mg/l metallic molybdenum, 12-15 mg/l molybdenum trioxide, 10-12 mg/l brown molybdenum dioxide, and 3-5 mg/l ammonium paramolybdate produced no toxic effects, with the exception of rapidly passing irritation of the mucosa of the upper respiratory passages and conjunctiva after ammonium paramolybdate exposure. Repeated dustings for 30 days with 8-10 mg/l molybdenum trioxide or 0.5-2.5 mg/l ammonium paramolybdate, however, resulted in pronounced toxicity, while repeated dustings over the same period with 12-15 mg/l metallic molybdenum or 8-10 mg/l molybdenum dioxide resulted in a mild toxic reaction. Severe toxic effects included hemorrhaging of the lung tissue, pronounced diffuse parenchymatous degeneration of liver cells, severe plethora of the liver, and parenchymatous degeneration of the epithelium of convoluted renal tubules.

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APTIC NO. 74215

Fukuda, Michio, Takuro Kasaki, Akira Koiwai, Hiroshi Kitano, Toshikyo Shinohara, and Yukihisa Tanaka

STUDIES ON WEATHER FLECK OF TOBACCO PLANTS. PART 19. SCREENING OF CHEMICALS FOR PREVENTING AND LESSENING OZONE-INJURY. (Tobacco no seiriteki hantenhyo ni kansuru kenkyu. dai 19-ho. ozone-shogai bojo yakuzai no screening). Text in Japanese. Okayama Tabaco Shikenjo Hokoku (Bull. Okayama Tob. Exp. Stn.), no. 35:75-85, March 1975. 38 refs.

The effectiveness of systemic fungicides (benzimidazole, oxathiin derivatives, and methylenedioxyphenyl derivatives) and some insecticide synergists in preventing or reducing ozone injury to tobacco plants was examined. Leaf and soil drench application of benzimidazole, its fungicidal derivatives, and fungicidal oxathiin derivatives were effective. Many derivatives of methylene dioxyphenyl, including piperonyl butoxide, were effective when applied onto leaves as well as some synergists for insecticides. Piperonyl butoxide showed the highest effectiveness, followed by benzimidazole and then by safoxane. Although benzimidazole and safoxane were effective by soil drench, piperonyl butoxide was not.

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51897

APTIC NO. 74178

Hatta, H. and K. Terakado

ON THE UTILIZATION OF INDICATOR PLANTS FOR PHOTOCHEMICAL OXIDANT DETECTION.

(Kokagaku oxidant ni taisuru shiyo shokubutsu no riyoho ni suite). Text in Japanese. Preprint, Japan Society for General Research, p. 87-88, 1975. (Presented at the Japan Society for General Research, Environmental Science Division Meeting, 1st, Tokyo, Japan, June 6-8, 1975.)

Morning glory and petunia plants were subjected to oxidant atmospheres in exposure chambers to assess their plant indicator potential. Chlorotic and necrotic symptoms appeared on the upper side of morning glory leaves after oxidant exposure and silencing and bronzing appeared on the lower side of petunia leaves. Continued oxidant exposure resulted in enlargement of the lesions. The position of the uppermost leaf which was injured increased by one or two as the leaves developed. There was a significant correlation between the damage index and the value of accumulated oxidant on the day before the appearance of damage. The developing young leaf of petunia was very susceptible to peroxyacetyl nitrate, and the white ansign variety was the most susceptible. The Cherie variety of morning glory is recommended as an indicator plant of oxidants. The intervarietal difference of the susceptibility of petunias was useful for ascertaining the cumulative value of PAN.

51898

APTIC NO. 74165

Kitano Hiroshi, Yoshitada Yamamoto, Toshimitsu Harada, Toshikiyo Shinohara, and Michio Fukuda

STUDIES ON WEATHER FLECK OF TOBACCO PLANTS. PART 17. ON THE CHARACTERISTICS OF STRAIN RH-2 SCREENED AS RESISTANT TO WEATHER FLECK.

(Tobacco no seiriteki hantenbyo ni kansuru kenkyu dai 17-ho. seiriteki hantenbyo teikosei sembutsu keito RH-2 no tokusei ni suite). Text in Japanese. Okayama Tabaco Shikenjo Hokoku (Bull. Okayama Tob. Exp. Stn.), no. 35:59-65, March 1975. 15 refs.

Weather fleck ozone-resistant Hicks-2 (RH-2) tobacco plants were developed using natural conditions of cultivation and an ozone exposure chamber. The resistance of its progeny (RH-2) was conspicuously higher than that of Hicks-2 (H-2) itself and also higher than that of Virginia 115. There were no differences between days to inflorescence, plant height, total number of leaves, and area of the largest leaf between RH-2 and H-2. Individual plant weight, especially dry leaf, of RH-2 was larger than that of H-2, while total leaf sugar of RH-2 was lower than that of H-2.

51899

APTIC NO. 73910

Koyama, M.

INVESTIGATION OF DAMAGE TO MORNING GLORY TO DETERMINE THE DEGREE OF OXIDANT EXISTENCE. (Asagao ni yoru kokagaku smog eikyo chosa). Text in Japanese. Shizen Hogo (Conserv. Nature), no. 155:14, April 1975.

Field observations of the damage to Scarlet O Hara and Violet varieties of morning glory in the Adachi ward of Tokyo are described. The experiment began on June 1, 1974 and damages occurred on June 5 during a photochemical smog episode.

51900

APTIC NO. 74119

Morikawa, Masaki, Yoshihiro Matsuoka, Tsuyoshi Takasaki, and Koji Shiratori

INFLUENCE OF PHOTOCHEMICAL OXIDANT ON THE GROWTH OF RICE PLANT PART I. STATE OF APPEARANCE OF VISIBLE SYMPTOMS DUE TO OZONE AS CLASSIFIED BY GROWTH STAGES.

(Suito no seiiku ni oyobosu kokagaku oxidant no eikyo dai 1-po. ozone kashishojo no seiiku jikibetsu hatsugen jokyo). Text in Japanese. (Chiba-ken Nogyo Shikenjo Kenkyu Hokoku (Bull. Chiba-ken Agr. Exp. Sta.), no. 16:103-112, 1975.

Visible symptoms due to ozone exposure were classified by growth stage for rice plants. In the nursery stage, the susceptibility of rice plants to ozone increased with the progress of growth. After transplantation, susceptibility to ozone was highest at the beginning of tillering and then decreased a little at the tillering stage. Subsequently, the ozone susceptibility dropped suddenly and almost disappeared.

51901

APTIC NO. 74122

Shoda, Mitsuyoshi, Seiko Imaizumi, Yoshinori Wada, and Isamu Suyama

STUDIES ON WEATHER FLECK OF TOBACCO PLANTS. PART 21. PROTECTING EFFECTIVENESS OF OXATHIIN AND ITS DERIVATIVE ON TOBACCO PLANTS FROM OXIDANT INJURY.

(Tobacco no seiriteki hantenbyo ni kansuru kenkyu. dai 21-po. oxathiin kagobutsu no tobacco oxidant shogai ni taisuru bojo koka). Text in Japanese. Okayama Tabaco Shikenjo Hokoku (Bull. Okayama Tob. Exp. Stn.), no. 35:97-98, March 1975.

The effectiveness of the systemic fungicides, 5,6-dihydro-2-methyl-1,4-oxathiin-3-carboxanilide and 5,6-dihydro-2-methyl-1,4-oxathiin-3-carboxanilide-4,4-dioxide in preventing oxidant injury to tobacco plants was examined in the laboratory (by ozone exposure) and in fields. The spray application of diluted suspensions (500:1 and 1000:1) of both fungicides prevented the appearance of ozone injury. Chlorosis appeared on leaves when more concentrated suspensions of the first compound were applied. The effectiveness of both chemicals appeared highest after 5 days of application; and it persisted for 10 days, without translocation into leaves. Even at 1500:1 dilution, the second fungicide protected tobacco leaves against oxidant injury without affecting the harvest and the quality of harvested leaves.

51902

APTIC NO. 74164

Suyama, Isamu, Reiko Mochizuki, and Kenichi Kunizawa

STUDIES ON WEATHER FLECK ON TOBACCO PLANTS. PART 15. TRANSITION OF OXIDANT CONCENTRATION AND DAMAGE OF TOBACCO PLANTS IN HATANO TOBACCO EXPERIMENT STATION.

(Tobacco no seiri-teki hantenbyo ni kansuru kenkyu. dai 15-ho. hatano tobacco shikenjo ni okeru oxidant nodo no shochu to tobacco no shogai). Text in Japanese. Okayama Tabaco Shikenjo Hokoku (Bull. Okayama Tob. Exp. Stn.), no. 35:47-49, March 1975. 5 refs.

Trends in ambient oxidant concentration and fleck damage to tobacco leaves are reported. As the daily maximum oxidant concentration of Hatano Station during May-July from 1967 to 1972 became larger year after year (11.4, 8.4, 16.5, 17.7, 19.0 and 32.0 pphm, respectively). The frequency of occurrence of leaf flecks on the tobacco variety H-2 increased, even for a resistant variety. The oxidant concentration was high on the day before severe flecks appeared. Oxidants appear to be one of the major causes of weather fleck on tobacco plants.

51903

APTIC NO. 74142

Taniyama, Teturo and Kagu Sawanaka

STUDIES ON CROP INJURIES DUE TO HARMFUL GASES PART 12 GROWTH OF RICE PLANT AND CHARACTERISTICS OF RICE CROP IN AIR-POLLUTED AREA OF YOKKAICHI, AND ON THE MEANING OF RICE PLANT AS PLANT INDICATOR OF AIR POLLUTION.

(Sakumotsu no gasu-shogai ni kansuru kenkyu Dai 12-ho. Taikiosenchiiki ((Yokkaichi-shi)) ni okeru suito no seiiku-shuryo no tokucho to taikiosen osen ni taisuru shiyo-shokubutsu to shite no igi ni suite). Text in Japanese. Nihon Sakumotsu Gakkai Kiji (Proc. Crop. Sci. Soc. Japan), 44(1):74-85, March 1975. 10 refs.

Rice plant growth and yield were examined in relationship to the degree pollution in Yokkaichi, Japan, with particular emphasis on sulfur oxides pollution. The growth of rice plants

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in air polluted areas was diminished, and crop yield was decreased by 35%. A correlation existed between crop yield and concentration of sulfur dioxide. Rice crop yield also correlated with the frequency of asthma attacks in the city, indicating the usefulness of the crop as a plant indicator.

51904

APTIC NO. 74141

Terakado, K. and H. Hatta

PROPOSAL OF A PROBLEM-EFFECT OF AIR POLLUTION ON RICE PLANT WHEN IT WAS OBSERVED NATIONWIDE. (*Hitotsu no mondai teiki-taikiosen ni yoru, suite o no eikyo o zenkokuteki ni miruto*). Text in Japanese. Preprint, Executive Committee for Symposium of Environmental Sciences, Tokyo (Japan), p. 91-92, 1975. (Presented at the Executive Committee for Symposium of Environmental Sciences, 1st Research Presentation Meeting, Tokyo, Japan, June 6-8, 1975.)

The effect of air pollution on the rice harvest in Japan was examined. There were 303 air pollution monitoring points throughout Japan during 1973, and the number of points where the time-ratio of 0.06 ppm/hr of oxidant was more than 17.5% was 95. The area of paddy field exposed to oxidant and the loss percent of harvest were respectively 300,000 hectares 2.1% (252,600 ton). The loss equalled the total rice crop of Shiga Prefecture. The loss was largest in Kanto-Tozan, followed by Kinki, then Tokai, and Chugoku. Losses due to air pollution were significant in composition to those due to weather conditions and pests. Losses concentrated on the Pacific coast and around Seto coincided with the distribution of petrochemical complexes in Japan. Sulfur dioxide is the probable cause of the damage.

51905

APTIC NO. 74177

Umemoto, K. and S. Tatsumi

CORRELATION BETWEEN AIR POLLUTION AND CRYSTAL PATTERN OF CALCIUM OXALATE IN PLANT LEAVES OF STREET TREES IN ITAMI CITY.

(*Taiki-osen to shokubutsu yonai shusan calcium kessho pattern tonon sakan: itami shinai no gairoju*). Text in Japanese. Preprint, Japan Society for General Research, p. 79-80, 1975. (Presented at the Japan Society for General Research, Environmental Science Division Meeting, 1st, Tokyo, Japan, June 6-8, 1975.)

A characteristic difference in calcium oxalate crystal patterns in leaves of roadside trees planted in relatively unpolluted northern parts of Itami City and in parts of the city polluted by automobile exhaust was discovered. The species of trees examined were Ginkgo biloba, Salix babylonica, Aphananthe aspera, Robinia pseudoacacia, and Poplar. The leaves of trees grown in relatively less air polluted areas displayed crystal aggregates of calcium oxalate (50-80 micron) that were arranged in rows on both sides of the central vein; some scattered crystal aggregates between veins were observed. Trees grown in air polluted areas showed irregular crystal patterns and more scattering of the crystals between veins. The cause of the observed differences in the pattern of crystal aggregates was attributed to the difference in metabolism of trees under different environmental conditions. Air pollutants disturb the normal metabolism of the tree and cause hyperproduction of calcium oxalate.

51906

APTIC NO. 74123

Uno, Yoshio, Yoshiyoki Miyake, Tomizo Matsunuma, Tatsuo Kamie, Yoshio Kikuchi, and Akira Watanabe

STUDIES ON WEATHER FLECK ON TOBACCO PLANTS. PART 14. RELATION BETWEEN OXIDANT CONCENTRATION, WEATHER CONDITIONS AND OCCURRENCE OF WEATHER FLECK IN AREAS HAVING TOBACCO FIELDS AS A CENTER IN KITAKANTO. (*Tobacco no seiriteki hantenhyo ni kansuru kenkyu. dai 14-po. kanto-hokubu no tobacco sanchi o chushin to shita taikichu oxidant nodo to kishojoken seihan hassei to no kankei*). Text in Japanese. Okayama

Tabaco Shikenjo Hokoku (Bull. Okayama Tob. Exp. Stn.), no. 35:35-45, March 1975. 13 refs.

The relationship between tobacco leaf fleck disease, oxidant concentration, and weather factors was investigated during June and July of 1971 through 1974 in North Kanto, Japan. Maximum oxidant concentration showed a correlation with diurnal temperature changes. Oxidant concentrations were often high on the day before or on the day that severe flecks appeared on tobacco leaves. However, the disease was not fully explained by the high oxidant concentrations.

51907

APTIC NO. 74048

Ushizima, T., Y. Fukushima, J. Aoshima, and T. Tazaki

INVISIBLE INJURIES BY SULFUR DIOXIDE TO PLANTS, CENTERING ON THE EFFECT TO THE PHOTOSYNTHETIC RATE OF THE LEAF.

(*Shokubutsu ni taisuru nisanka io no fukashi shogai - ha no kogosei sokudo e no eikyo o chushin ni*). Text in Japanese. Preprint, Japan Society for General Research, p. 89-90, June 1975. (Presented at the Japan Society for General Research Division of Environmental Science Division Meeting, Tokyo, Japan, June 6-8, 1975.)

The invisible effects of sulfur dioxide at the low concentrations of 0.25 and 0.50 ppm were examined on Helianthus annuus by measuring the intake rate of carbon dioxide (photosynthesis rate) and the expiring rate of water (transpiration rate). Interspecies differences in the effects were also examined using Pharbitis nil, Zea mays, and Sorghum vulgare. The intake rate of carbon dioxide rapidly began to reduce as soon as exposure was begun, and the expiring rate of water also began to reduce a little later. The inhibition of both functions continued as about a constant rate during the exposure; however, the rates were not completely reduced after stopping the exposure. The effect of reducing carbon dioxide intake rate was proportionately larger to the original rate of intake. The susceptibility differed among the plants.

51908

APTIC NO. 74146

Yoshioka, K.

SOCIO-ECOLOGICAL STUDY OF PINE-WITHERING DUE TO AIR POLLUTION - CRITICAL EXAMINATION FROM SOCIO-ECOLOGY OF THE THEORY OF PINE-WITHERING BY WOOD NEMATODES.

(*Taikiosen ni yoru matusugare no shakaiseitaigaku-teki kenkyu - matusugare zaisenchu setsu no shakaiseitaigaku-teki kikan kento*). Text in Japanese. Preprint, Executive Committee for Symposium of Environmental Sciences, Tokyo (Japan), p. 254-255, 1975. (Presented at the Executive Committee for Symposium of Environmental Sciences, 1st Research Presentation Meeting, Tokyo, Japan, June 6-8, 1975.)

The withering of pine trees is ecologically examined in relation to Monochamus alternatus bearing pine-wood netatodes and air pollution. There is an ecological balance between the pine tree, Monochamus alternatus, the nematode, and spider mites; and, when the pine tree is injured by pollution, Monochamus alternatus attacks. However, spider mites eat the nematodes, thus establishing a balance.

51909

APTIC NO. 74175

EXPERIMENTAL STUDY ON THE EFFECT OF PHOTOCHEMICAL SMOG. (*Kokagaku smog no eikyo jikken*). Text in Japanese. Shigaku Kyoiku Kenkyusho Kiyo (J. Jap. Private Sch Educ. Inst.), no. 23:91-93, 1975. 10 refs.

The effects of sulfur dioxide on plants were studied by immersing leaves in 0.06% (600 ppm) sulfuric acid solution for 30 to 90 min. Leaves that showed injuries within 30 min were termed as weak, between 30 to 60 min as medium, and between 60 to 90 min as strong in resistance to SO₂. Maidenhair tree and camphor tree were strong in resistance.

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Injuries were correlated with growing stage, strong insolation and high temperature. Sensitive plants also showed injuries after exposure to 0.03 ppm ozone and 0.01 ppm peroxyacetyl nitrate.

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APTIC NO. 74260

Duell, Ruprecht

RECENT STUDIES ON MOSSES AS DIFFERENTIATED ECOLOGICAL INDICATORS OF SO₂ CONCENTRATION IN THE INDUSTRIAL AREA ENCLOSED BETWEEN RHINE AND RUHR AT DUISBURG.

(Neue Untersuchungen ueber Moose als abgestufte oekologische Indikatoren fuer die SO₂-Immissionen im Industriegebiet zwischen Rhein und Ruhr bei Duisburg). Text in German. VDI (Verein Deutscher Ingenieure) -Kommission Reinhaltung der Luft, Duesseldorf (Germany), 33p., 1974 (?). 22 refs.

The occurrence and frequency of different moss species as possible indicators of sulfur dioxide concentrations were studied in 40 area units of 9 sq km each in an industrial area enclosed between Rhine and Ruhr at Duisburg on the basis of the SO₂ survey prepared by Stratmann and Ixfeld. The moss species found in this area were classed in 6 indicator groups from 0 to 6 to which indicator values (air purity values according to Leblanc) were assigned. One variety and 51 species had zero indicator value, i.e., they were resistant to SO₂. Twenty-five species with air purity value 2 with indicator value 1 were scarce in areas with SO₂ peaks over 0.55 mg/cu m or 0.16 mg/cu m background concentration. Thirty species with air purity value 3 were scarce in areas with SO₂ peaks over 0.46 mg/cu m and with background concentrations over 0.135 mg/cu m. Twenty-four species with air purity value 4 were real indicators of clean air. They were absent in areas with SO₂ peaks over 0.46 mg/cu m and with background concentrations over 0.12 mg/cu m. Seven species; *Encalypta streptocarpa*, *Campylopus flexuosus*, *Homalia trichomanoides*, *Dicranum scoparium*, *Metzgeria furcata*, *Oxyrrhynchium pumilum*, and *Porella platyphylla*, were scarce in the entire area surveyed, or occurred only in sheltered sites. *Barbilophozia barbata*, *Fruilanina dilatata*, *F. tamarisci*, *Lophozia incisa*, *Marsipella funckii*, *Metzgeria conjugata*, *Scapania irrigua*, *Trichocolea*, *Tritomaria exsecta* and other species were not found at all.

51911

APTIC NO. 74143

Hamashima, Shigetake and Tatsuo Suzuki

RELATIONSHIP BETWEEN THE DAMAGE OF PINUS THUNBERGII AND SULFUR OXIDE AIR POLLUTION. (Kuromatsu no higai to io sankabutsu ni yoru taikiosen to no kankei). Text in Japanese. Nihon Seitai-kai-shi (Jap. J. Ecol.), 24(3):226-228, Sept. 1974. 6 refs.

Damage to pine trees (*Pinus thunbergii*) in the southern area of the Nagoya coastal industrial zone and the Koromogaura industrial zone was investigated in relation to air pollution. A close relationship between the damage index and average sulfation of sulfur oxides was observed. The number of the trees with epiphytic bryophyte decreased when the atmospheric level of sulfur oxides was over 2 mg.

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APTIC NO. 73793

Hatta, H. and K. Terakado

EFFECTS OF AIR POLLUTION ON THE GROWTH OF PLANTS. PART I: ON THE GROWTH OF WHEAT.

(Taiki osen ga shokubutsu no seicho ni ataeru eikyo (1) komugi no seicho ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):357, Nov. 1974.

Wheat was grown in a filtered air greenhouse and a non-filtered air greenhouse early in winter when the concentration of air pollutants is relatively low. The ventilation was 2-3 times/hr with the temperature and moisture controlled to match those outside. The potted wheat plants (No. 61 Norin variety) were

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classified as C (kept from seeding to harvest in clean air room), GI (kept throughout in an uncleaned air room), GII (removed from the clean to the non-cleaned room at the earing stage), and GIII (removed from the clean to the non-clean room at the maturing stage). The filtering effect of the clean air room was sulfur dioxide 3.8/1.3, nitrogen dioxide 8.0/4.7, nitric oxide 5.5/5.2, ozone 3.5/1.0-12.5/2.8 ppm/ppm, and peroxyacetyl nitrate 3.3/1.5-4.8/2.2 ppb/ppb. The growth of the plants showed differences during the inter-nodal growth stage. In the weight of ear/unit weight of leaf a difference was seen between C and GI: (C) 7.05, GI(5.83), GII(7.06) and GIII(7.06).

51913

APTIC NO. 73794

Hatta, H. and K. Terakado

EFFECTS OF AIR POLLUTION ON THE GROWTH OF PLANTS. PART II: ON THE GROWTH OF TREES.

(Taiki osen ga shokubutsu no seicho ni ataeru eikyo (2) mokuhon shokubutsu no seicho ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):358, Nov. 1974.

Poplar, mulberry, and Quercus trees were planted as cuttings in the soil in a filtered air greenhouse and in a non-filtered air greenhouse in April and their length, diameter, the area of leaves, the number of leaves, and the number of fallen leaves of new twigs were determined overtime. The number of leaves, length of new twigs, and diameter of poplar, mulberry and Quercus trees in the non-filtered air room were inferior to those in the filtered air room; the difference was especially marked in poplar and Quercus. The amount of growth (square of diameter multiplied by length) of poplar showed a larger difference as time increased. Although there was no difference in the number of developed leaves, the number of leaf-fall was very high in the non-filtered air room.

51914

APTIC NO. 74082

Murayama, T. and K. Kato

COMPOUNDS PREVENTING PLANT DAMAGE BY GASES. (Shokubutsu gasu shogai bogyo souseibutsu). Text in Japanese. (Nihon Soda Co. Ltd., Tokyo (Japan)) Japan. Pat. Sho 49-35549. 14p., Sept. 24, 1974. (Appl. Oct. 20, 1971, 1 claim).

Substances which prevent damage to plants by ozone, peroxyacetyl nitrate, hydrocarbons, and carbon dioxide and whose active components contain one or more types of thioalophanates, are described. Structural formulas of 47 thioalophanates and their melting points are listed. In most cases decomposition upon melting occurs between 140-206 C. General reaction equations for synthesis of these thioalophanates are listed. Thioalophanates have been recognized for bactericidal and miticidal properties in concentrations of 350-1000 ppm. To protect plants from gas damage, compounds must remain in the plant for a long time. Spraying on the leaves should be at concentrations above 1000 ppm, preferably from 2500-5000 ppm. For mixing with 1 kg of dry soil, concentrations should be above 2500 ppm, preferably from 3500-4000 ppm. Gas damage preventatives can be used in the form of hydrate, aqueous solution, emulsion, or powder and can be distributed on the plant surfaces, mixed with soil, or injected. Carriers and solvents for the compounds include clay, kaolin, diatomaceous earth, talc, silica, benzene, xylene, kerosene, alcohol, and dimethylformamide. A 70% hydrate of preventative was made by mixing 70 parts of thioalophanate with 20 parts diatomaceous earth, 5 parts alkyl sodium sulfate, and 5 parts polyoxyethylenephenyl ether. Powder and emulsion formulations are also given. Young tobacco (*Nicotiana tabacum*) and kidney bean (*Phaseolus vulgaris* L.) plants were exposed to ozone (0.25 ppm for 4-6 hours in a hot house), after treatment by the preventative. Percentage plant damage was defined as amount of damaged surface area/total leaf area times 100. Tobacco grown in untreated soil showed 89% damage. Tobacco grown in treated soil showed damage of 0-6% upon exposure to ozone after about 30 days growth. Leaf-treated kidney beans showed damage of 0-31%, while untreated plants

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showed 65% damage. Soil-treated kidney beans showed damage of 0-18%, while kidney beans grown in untreated soil showed 68% damage.

51915

APTIC NO. 73792

Nakamura, T., S. Matsunaka, Y. Ota, and S. Shibukawa

SURVEY OF PLANT DAMAGES DUE TO PHOTOCHEMICAL SMOGS IN NORTH KANTO AREA IN 1973. (Showa 48-nen Kita-kanto chiiki ni okeru kokagaku sumoggu ni yoru shokubutsu higai chosa). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):359, Nov. 1974.

To determine the extension of plant damages in the North part of the Kanto area from photochemical smogs generated in the metropolitan district an actual survey was carried out using morning glory, agricultural crops, and Zelkova as index plants in the autumn of 1973 in four representative areas, Kasumigaura (Ibaragi Pref.), the northeastern area of Tochigi Pref., the northern area of Gunma Pref., and the Chichibu area (Saitama Pref.). In Kasumigaura damages were found on morning glory, ground nut, and Zelkova at all points except the Kasuma area. Japanese radish, a species of Quamoclit, melon, and Abermoschus esculentus were damaged at some points. In Kasuma damages by other pollutants were seen in Pines and Zelkova; morning glory, Glycine max, ground nut and Taro were damaged. There was a clear line over which damage of Zelkova and morning glory stopped; some damage was seen on morning glory only in the southernmost regions; and there were places where damages to plants were severe. In general, the photochemical smog generated in the metropolitan district now pollutes broad areas of Kanto, damaging several kinds of plants. Morning glory is a good index plant for smog.

51916

APTIC NO. 74032

Ratsch, Hilman C.

HEAVY-METAL ACCUMULATION IN SOIL AND VEGETATION FROM SMELTER EMISSIONS (FINAL REPORT). Environmental Protection Agency, Corvallis, Oreg., National Ecological Research Lab., Program Element 1AA006, ROAP/Task 21BCI-01, Rept. EPA-660/3-74-012, 28p., Aug. 1974.

Soil and plant samples were collected in the vicinity of a copper smelter and analyzed for their heavy metal content. The soil concentrations of lead, arsenic, cadmium, and mercury generally declined with increasing distance from the smelter, although concentrations at points 0.25-0.5 mi from the smelter stack were consistently lower than those at 0.5-1.0 mi due to plume rise and looping. Levels of arsenic, cadmium, lead, and mercury measured in the soil ranged from 7.3-457 ppm, 1.0-8.3 ppm, 9-743 ppm, and 0.2-11.0 ppm, respectively. Arsenic and cadmium were present at levels likely to be toxic. Vegetation levels of arsenic and cadmium also decreased with increasing distance from the smelter, but lead and mercury concentrations did not appear to be related to distance from the smelter. Cadmium and mercury appeared to represent a possible health hazard as constituents of leafy vegetables. (Author abstract modified)

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APTIC NO. 74044

Ratsch, Hilman C.

SULFUR CONTENT OF DOUGLAS-FIR FOLIAGE NEAR A PAPER MILL (FINAL REPORT). Environmental Protection Agency, Corvallis, Oreg., National Ecological Research Lab., Program Element 1AA006, ROAP/Task 21 AIR 03, Rept. EPA-660/3-74-018, 17p., Aug. 1974. 2 refs.

Douglas fir needles were collected at 11 sites in the vicinity of a pulp and paper mill and examined for sulfur content and sulfur dioxide injury. The total sulfur content of the needles ranged from 0.1-0.2% at eight locations and from 0.5-1.0% at three hillside locations. Most of the Douglas fir needles with

high sulfur values showed no visible sulfur dioxide injury, though the high sulfur values in the needles indicated that sulfur dioxide is being absorbed by the foliage at a level that is borderline to the production of visible injury. Severe injury symptoms observed at a state park site appeared to be due to sulfur dioxide and consisted of tip burn, needle necrosis, chlorotic mottle, and needle loss. Histological examination of the injured needles revealed collapse and pigmentation of the mesophyll in the upper part of the needle and occasionally in the mesophyll below the vascular bundle. (Author abstract modified)

51918

APTIC NO. 74240

Smet, S. Denaeys-De

DISTRIBUTION OF CADMIUM IN VARIOUS POLLUTED AND NONPOLLUTED TERRESTRIAL ECOSYSTEMS. (Premier aperçu de la distribution du cadmium dans divers écosystèmes terrestres non pollués et pollués). Text in French. Oecol. Plant., 9(2):169-182, 1974. 20 refs.

The cadmium content of various plants growing in different regions of Belgium was determined to establish the extent of uptake from the air and the soil. Plants exposed to airborne emissions from zinc smelting operations showed Cd values of 10-400 times the normal. Motor vehicle traffic also appeared to contribute to increased Cd accumulation. Plants growing in soils containing unusually high Cd concentrations did not accumulate Cd to the extent that those exposed to airborne Cd emissions did, suggesting an adaptation mechanism involving the root blocking of Cd.

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APTIC NO. 74041

Taylor, F. G., Jr., L. K. Mann, R. C. Dahman, and F. L. Miller

ENVIRONMENTAL EFFECTS OF CHROMIUM AND ZINC IN COOLING WATER DRIFT. Atomic Energy Commission, Oak Ridge, Tenn., Oak Ridge National Lab. and the State of Maryland, Cool. Tower Environ. Symp., College Park, Md., 1974, 30p. 25 refs. (March 4-6.)

An inventory of plant and soil materials in the environs of the Oak Ridge Gaseous Diffusion Plant provided quantitative evidence for the transfer of chromium and zinc to vegetation from a cooling tower operation. Chromium concentrations in foliage ranged from several orders of magnitude above background levels to near background at 1609 m from the tower. Concentrations of extractable zinc ranged from 5-72 ppm at distances of 180 and 15 m, respectively, indicating no increase above background at 180 m. Potted tobacco plants placed downwind from the plume accumulated chromium, reaching equilibrium and attaining maximum concentrations (237 + or - 18 ppm) after 4-6 wk of exposure. While the tobacco plants (highly sensitive to chromium) developed symptoms of toxicity to drift, similar effects were not observed for native plant species at similar concentrations and downwind distances. Vegetation analyses along a horizontal gradient indicated that the equilibrium concentration in foliage and litter remained relatively constant, provided that additions of treatment chemicals to makeup water and drift emission rates remained unchanged. Distribution coefficients for hexavalent chromium added in solution to soils showed that little chromium was absorbed. Values for zinc indicated that the soil acted as a reservoir for the small quantities derived from drift. (Author abstract modified)

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APTIC NO. 73868

Zimdahl, R. L.

LEAD IN SOILS AND PLANTS. In: Environmental Contamination Caused by Lead (Interim Report). Colorado State Univ., Fort Collins, National Science Foundation Grants GI-34813X1 and GI-44423, p. 332-383, Dec. 31, 1974. 49 refs.

The behavior of lead in soil and its uptake by the foliage and roots of plants were studied. Various soils showed a large capacity for the immobilization of lead, and this capacity was related directly to the cation exchange capacity and inversely to the soil pH. Organic matter was determined as the primary immobilization agent for lead in soil. Lead uptake by the roots of kidney bean, soybean, and corn was not influenced by metabolic inhibitors or low temperature (4°C) but was dependent on solution pH, suggesting that the process does not require energy expenditure by the plant. Exposure of living plants to lead bromochloride aerosols revealed that lead remained as a topical coating on the foliage since virtually all of the lead added to the plants was removed by chloroform rinse or mild acid wash. Only extremely small amounts of lead penetrated the cuticles of leaves and fruits; removal of the waxes permitted increased penetration of some cuticles, and the penetration seemed more related to the plant species than to the cuticle thickness. (Author abstract modified)

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APTIC NO. 73791

Suwa, T.

FIELD SURVEY OF PLANT DAMAGES DUE TO PHOTOCHEMICAL OXIDANTS IN SOUTHERN KANTO DISTRICTS. PART I. OCCURRENCE OF PLANT DAMAGE. (Minami Kanto chiiki ni okeru okishidanto shokubutsu higai chosa, sono I, shokubutsu higai no hassai jokyō). Text in Japanese. *Taiki Osen Kenkyū* (J. Japan. Soc. Air Pollution), 9(2):360, Nov. 1974.

The damage to vegetables which are susceptible to oxidants was surveyed in a circle having a radius of 60-70 km with the Tokyo metropolis as a center. The dates of survey were June 23 and July 26, each 48 hr after the occurrence of photochemical smog. Of 204 plants investigated, damage was recognized on 36 plants on June 23, especially in Tokyo and Kanagawa and predominantly on spinach, *Beta vulgaris*, Welsh onion, and *Colocassia antiquorum*. Of 328 plants investigated on July 26, damage was found on 265 plants, predominantly morning glory, *Colocassia antiquorum*, peanut, and maize, the distribution of damage covering all the Southern Kanto district except for a few areas.

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APTIC NO. 73925

Kanagawa Prefectural Office (Japan)

STUDIES ON THE EFFECT OF OZONE ON SOFT VEGETABLES. (Yasairui ni taisuru ozone no eikyo ni kansuru kenkyū). Text in Japanese. In: *Kanagawa Prefectural Public Nuisance White Paper*, p. 330, Dec. 1974.

Swiss-chard and Chinese cabbage were exposed to ozone and their symptoms and toxic tolerances for ozone were examined. Chinese cabbage exposed to ozone at 140 ppm/hr showed bleached spots on the upper side of leaf, identical to symptoms seen in the field. Treatment with piperonyl butoxide was more effective in treatment of the lower side of the leaf. Swiss-chard exposed to ozone at 280 ppm/hr showed the same bleached spots on the upper side of leaf as those observed in the field. Piperonyl butoxide lessened the injury. Chinese cabbage showed a higher susceptibility to ozone than Swiss-chard.

51923

APTIC NO. 73926

Kanagawa Prefectural Office (Japan)

A STUDY ON THE EFFECT OF PIPERONYL BUTOXIDE IN LESSENING OZONE INJURY TO PLANTS. (Shokubutsu no ozone shogai keigen ni kansuru piperonyl butoxide no koka ni kansuru kenkyū). Text in Japanese. In: *Kanagawa Prefectural Public Nuisance White Paper*, p. 330, Dec. 1974.

Spinach leaves having damages on more than 30% of the total area numbered 11.2 after exposure to ozone at 0.2 ppm for 3 hr; however, the number of damaged leaves was only 0.2 when piperonyl butoxide was sprayed on spinach under these same conditions. After repeated exposure to ozone the number

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of damaged leaves increased to 1.7. The effect of piperonyl butoxide continued for 5 days after ozone exposure. On the other hand, an additional application of potassium fertilizer also lessened the ozone injury slightly; leaf damage decreased from 17.5 to 13.8.

51924

APTIC NO. 73928

Kanagawa Prefectural Office (Japan)

STUDIES ON THE EFFECTS OF PURIFIED AIR ON THE GROWTH OF VEGETABLES. (Kuki joka ga yasai to no seiku no oyobosu eikyo ni kansuru kenkyū). Text in Japanese. In: *Kanagawa Prefectural Public Nuisance White Paper*, p. 332, Dec. 1974.

Damage to plants by photochemical oxidants and the effects on growth and yield of agricultural crops was studied by raising spinach, Welsh onion, and morning glory in two vinyl houses; one ventilated by purified air which was filtered ambient air by a manganese-active carbon catalyst, and the other received ambient air. In the event of high concentrations of oxidants, the plants in experimental chamber were greatly injured; however, those in the clean room showed almost no injury. By using the manganese-active carbon catalyst filter, the concentration of oxidants could be reduced to 1/3 or 1/4 for 6 months.

1973

51925

APTIC NO. 75402

Fahrig, R.

DEMONSTRATION OF A GENETIC EFFECT FROM ORGANIC PHOSPHATE INSECTICIDES. (Nachweis einer genetischen Wirkung von Organophosphor-Insektiziden). Preprint, German Research Society, Freiburg, Central Lab. for Mutagenicity Testing, 1973. 4 refs. Translated from German, 4p.

The ability of various organic phosphorus insecticides to induce mitotic gene conversion in yeast cells (the diploid D4 strain of *Saccharomyces cerevisiae*) was studied. The genetically most active compounds, dichlorvos and dimethoate, also showed the strongest inactivating effect on yeast cells. The genetic action of all insecticides tested appeared to be based on the same mechanism, the alkylation of deoxyribonucleic acid.

51926

APTIC NO. 74128

Shimada, Noritsugu, Masami Sumiyoshi, Seishi Toyoda, and Michiya Kojima

CONTAMINATION OF ROADSIDE SOIL AND VEGETATION WITH LEAD, ZINC AND CADMIUM. (Doro shuhen no dojo oyobi shokubutsu no namari, zen, cadomium ni yoru osen). Text in Japanese. *Chiba Daigaku Engei gakubu Gakujutsu Hokoku* (Tech. Bull. Fac. Horticulture, Chiba Univ.), no. 21:65-73, Dec. 1973. 10 refs.

The contamination of soil and vegetation with lead, zinc, and cadmium was determined along heavy traffic routes in Matsudo and Kashiwa Cities in 1973. Lead and Zn soil levels near the road were 59-90 ppm and 222-311 ppm, respectively. Cadmium levels were also elevated in some places. The levels of Pb, Zn and Cd in leaves of the roadside plants *Solidago altissima* and *Agropyron kamoji* were also elevated. The Pb level in *Solidago altissima* was 15.5-39.1 ppm 30 m from the road. The content of the metals in the soil showed some variation with weather and season, with the range of variation being larger at the points nearer to the road. The content of metals in roadside plants showed species differences, and in *S.a.* the content increased with time.

51927

APTIC NO. 74156

Shinohara, Hisashi, Issei Nakamori, and Kenjiro Takeshita

METHODS FOR EXAMINATION OF PLANT DAMAGE BY AIR POLLUTION. (Taiki osen busshitsu ni yoru

EFFECTS-MATERIALS

shokubutsu higai no kenshin hoho). Text in Japanese. In: Survey and Research Report on Medical Examination Method of Pollution-Caused Health Damages, Kyushu Environmental Management Assoc., Fukuoka (Japan). p. 111-112, March 1973.

The correlation of plant damage with particular pollutants is discussed. Computer technology should be used eventually to formulate quick and accurate conclusions, but much data must be collected first. Regular environmental monitoring is necessary to determine pollution sources. Meteorological and topographical data must be collected, including data on soil quality, length of contact between plant and pollutant, and plant growth. Smoke pollution damage is frequently erratic, and does not show regular symptoms. The collection of enough data for computer analysis may help diagnose the situation. Toxic gases in the atmosphere must be analyzed in the air, since the pollutants themselves are not evident in the damaged plant.

1972

51928

APTIC NO. 74035

Roberts, T. M.

PLANTS AS MONITORS OF AIRBORNE METAL POLLUTION. J. Environ. Plann. Pollut. Control, 1(1):43-54, 1972. 52 refs.

The use of plants as monitors of airborne metal pollution is reviewed. Analysis of grasses gives a general idea of the environmental metal burden, though it is often difficult to assess the contributions made to foliar metal levels by direct atmospheric fallout due to the complexity of root uptake processes and translocation within the plant. This problem can be avoided by the analysis of mosses and lichens which obtain their nutrients either from rainfall or by the impaction and sedimentation of airborne dusts. The sorption and retention of metals by the woodland moss, *Hylacomium splendens*, have the following decreasing order: copper, lead, nickel, cobalt, zinc, and manganese.

1074

51929

APTIC NO. 74051

Kanagawa Prefectural Office (Japan)

STUDIES ON THE EFFECTS ON OZONE AND SULFUR DIOXIDE TO PERENNIALS SUCH AS DECIDUOUS FRUIT TREES, SATSUMA ORANGE, AND TREES UTILIZED FOR THEIR WOOD. (Einen shokubutsu (rakuyo-kaju, mikan, zaimoku) ni taisuru ozone, arysan gasu no eikyo ni kansuru kenkyu). Text in Japanese. In: Kanagawa Prefectural Public Nuisance White Paper, p. 331-332, Dec. 1974.

Deciduous fruit trees such as vine and persimmon showed no symptoms after exposure to ozone at 0.2 ppm for 13 hr. After exposure to ozone the two kinds of trees were exposed to sulfur dioxide at 0.2 ppm, and brown spots appeared on the top leaf of persimmon tree and on leaves from the stem of the vine. Although the injury due to sulfur dioxide was aggravated when the trees exposed first to ozone and then to sulfur dioxide, it was not aggravated when the order to exposure was reversed. The increased amount of sulfur content in leaves was larger in the vine vein than in the persimmon. The Satsuma orange showed no visible injury under exposure to ozone at 0.2 ppm for 12 hr, sulfur dioxide at 1 ppm for 12 hr in only orange, but the sulfur content of the leaves increased 20-30%. Mulberry trees behaved as Satsuma oranges. Exposure of Japanese azalea (omurasaki), pasania, gardenia, poplar, hydrangea, zelkova, lilac, acacia and magnolia to ozone and sulfur dioxide is described.

EFFECTS-MATERIALS

1975

APTIC NO. 73923

51930

Ergang, R. and M. B. Rockel

RESISTANCE OF STAINLESS STEEL TO ATMOSPHERIC CORROSION. EVALUATION OF 10-YEAR EXPOSURE TESTS. (Die Korrosionsbeständigkeit der nichtrostenden Stähle an der Atmosphäre - Auswertung von Versuchen bis zu 10 jähriger Auslegung). Text in German. Werkstoff Korrosion, 26(1):36-41, Jan. 1975. 1 ref.

Corrosion tests extending up to a 10-year exposure on different stainless steel alloys in normal urban, industrial, and maritime air are described. A chromium-nickel-molybdenum steel with 16.5-18.5% Cr, 10.5-12.5% Ni, and 2-2.5% Mo was most corrosion-resistant in urban, industrial, and maritime air, and specimens with ground or polished surfaces were most resistant. Another chromium steel with 17% Cr was strongly corroded in industrial and maritime air. The bottom sides of specimens made of 18/8 CrNi steel were corroded in urban air, due to the absence of self-purification by precipitation. The susceptibility to pitting declines in the order of 17% Cr, 17 CrMo, 18/9 CrNi, and 18/10/2 CrNiMo.

51931

APTIC NO. 74160

Kanou, K., Y. Fujiwara, H. Shiomi, and M. Sanada

RELIABILITY OF ELECTRONIC PARTS EXPOSED TO SULPHUROUS ACID GAS IN HIGH MOISTURE AND DRY ATMOSPHERE. (Kanso oyobi koshitsudo chu deno arysan gasu bakuro ni yoru denshi buhin no shinrai-sei ni suite. dai-1-ho. Text in Japanese. Denshi Gijutsu Sogo Kenkyusho Iho Electrotech. Lab. Bull.), 39(1/2):70-73, Jan./Feb. 1975. 1 ref.

Electronic parts were exposed to sulfur dioxide in wet and dry atmospheres. The testing device consisted of a diaphragm pump, flow meter, thermister, gas analyzer, temperature controller, permeation tube (containing liquefied SO₂), humidifier, and sample cell. The performance of a thin-film resistor, a thick-film resistor, and an epoxy resin molded silicone diode was tested after exposure to SO₂ for 1000 hr. A nickel-chromium thin-film resistor element showed marked variation in resistance in both wet and dry atmospheres. A ruthenium oxide-silver thick-film resistors element showed separation of the resistance film. Variation in the reverse current of diodes was higher in wet atmospheres, and corrosion of the lead wire and metal cap was observed.

51932

APTIC NO. 73814

Otake, Noriaki, Takeshi Horikawa, Hideo Shiya, Hidesaburo Yasukawa, and Koichi Kato

EFFECT OF ATMOSPHERIC COMPONENTS ON THE LOW CARBON STEEL CORROSION IN NIIGATA CITY. (Taiki chu seibun no tei tanso koban fushoku ni oyobosu eikyo, Niigata-shi no bawai). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 774, 1975. (Presented at the Japan Chemical Society Spring Term Annual Meeting, 32nd, Tokyo, Japan, April 1-4, 1975, Paper 1025.)

The corrosion of low carbon steel was examined at 67 locations in Niigata city. A steel plate sized in 22 cm by 10 cm by 0.6 mm thickness was exposed to the atmosphere for one year and pieces were cut from the plate every 10 days to determine the decreased weight of the plate from which the degree of corrosion in mm was calculated using the steel density and surface area of plate. For the same period, rainfall at each location was collected and analyzed for sodium, potassium, chloride, and sulfate contents. At 35 locations corrosion was less than 0.30 mm after 6 mo of exposure of the steel plate, however the number of such locations decreased to 15 after 8

mo. In polluted areas, the steel corrosion proceeded rapidly and leveled out to 0.05 mm after a few months. A high correlation of 0.766 between the amount of rainfall and the degree of corrosion was found; however, the correlation between the amount of rainfall and the amount of rainfall components was poor, therefore, poor correlation between the degree of corrosion and rainfall components resulted. The consideration of atmospheric temperature and humidity, and sunlight are also necessary to give better correlation of steel plate corrosion with meteorological conditions.

51933

APTIC NO. 75153

Upam, James B. and Victor S. Salvin

EFFECTS OF AIR POLLUTANTS ON TEXTILE FIBERS AND DYES (FINAL REPORT). Environmental Protection Agency, Research Triangle Park, N. C., Chemistry and Physics Lab. and North Carolina Univ., Greensboro, Environmental Protection Agency Contract PH 22-68-2, Program Element 1AA008, Rept. EPA-650/3-74-008, 91p., Feb. 1975. 95 refs.

NTIS: PB 241507/AS

Results from a literature survey of the damaging effects of such air pollutants as sulfur oxides, nitrogen oxides, ozone and particulates on textile fibers and dyes are presented. Major problems identified include: excess soiling of fabrics; loss in strength of cellulosic and nylon materials by acids derived from SO_x; fading of certain dyed cellulosic, acetate, and nylon fabrics as a result of nitrogen dioxide and/or ozone exposure; NO₂-induced yellowing of undyed white fabrics; and ozone-induced fading of permanent press polyester/cotton fabrics and nylon carpets. A public opinion survey demonstrated that consumer awareness of these major air pollution effects on household textile products is generally lacking. (Author abstract modified)

1974

51934

APTIC NO. 74072

Schnitzler-Bruecken, Heinrich and Walter Betz

STUDIES ON THE FORMATION OF SILVER SULFIDE, THE CREEPING OF THIS SULFIDE ON GOLD, AND ATTEMPTS TO PREVENT THIS PHENOMENON. (PART I). (*Untersuchungen ueber die Bildung von Silbersulfid, das Aufkriechen dieses Sulfides auf Gold und ueber Versuche zur Behinderung dieser Vorgaenge (Teil I).*) Text in German. *Metalloberflaeche*, 28(10):373-382, Oct. 1974. 13 refs.

The effect of hydrogen sulfide, sulfur dioxide, ethylene vapor, and humidity on solid gold, silver, gold-plated silver, bronze, and brass as used in cradle relays was studied at different temperatures. The silver sulfide layer formed on silver exposed to artificial air with 1 ppm H₂S and 3 ppm SO₂ was looser at 40% relative humidity than at 18% relative humidity. While H₂S attacked silver and brass, it did not affect pure gold and gold-plated silver in synthetic air containing 10 ppm H₂S and 20 ppm SO₂. A certain inhibition of the corroding action of H₂S by SO₂ was observed. This gas did not affect silver, gold, and gold-plated silver. No sulfide formation on silver was observed in the presence of SO₂ and ethylene vapor. The findings indicate that SO₂, usually present in concentrations below 1 ppm in the air in telephone exchanges, causes no noteworthy corrosion problem. While H₂S is usually present in lower concentrations than SO₂, high concentrations may occur temporarily, which results in sulfide formation on silver contacts, and in the creeping of silver sulfide on gold-coated silver contacts as observed in practice.

51935

APTIC NO. 71838

Utsunomiya, Takayoshi

RHE EFFECT OF AIR POLLUTION BY HYDROGEN SULFIDE ON COPPER CORROSION. (*Ryuka suiso ni yoru taiki osen to kinzoku fushoku*). Text in Japanese.

AIR POLLUTION ABSTRACTS, OCTOBER 1975

Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):393, Nov. 1974. (Presented at the National Air Pollution Research Conference, 15th, Chiba, Japan, Nov. 6-8, 1974, Paper 248.)

The effect of hydrogen sulfide on copper plate corrosion is studied in Takeo city near a carbon disulfide factory and several areas surrounding the factory. A copper plate was pretreated by hydrochloric acid and ethyl alcohol and exposed to the air for days. Copper reacts with hydrogen sulfide to form copper sulfide; therefore, the amount of corrosion was determined by the sulfur content on the copper surface measured by X-ray fluorescence. In a 50-day exposure experiment, the sulfur amounts on the copper surface at two different locations 260 m and 1100 m from the factory, were respectively 26 and 16 times more than that observed in a control experiment utilizing an atmosphere of 10 ppb sulfur dioxide and no H₂S. An atmospheric H₂S level of 203 ppb 260 m from the factory is calculated by the Lucas diffusion equation, while the observed level was 100 to 200 ppb. The copper surface became blackened within a week at this location, and a logarithmic growth of copper corrosion was observed up to 15 days of exposure; however, further exposure gave a parabolic growth.

EFFECTS-ECONOMIC

1975

51936

APTIC NO. 75136

Schwartz, W. A., F. B. Higgins, Jr., J. A. Lee, R. Newirth, and J. W. Pervier

ENGINEERING AND COST STUDY OF AIR POLLUTION CONTROL FOR THE PETROCHEMICAL INDUSTRY. VOLUME 2: ACRYLONITRILE MANUFACTURE (FINAL REPORT). Air Products and Chemicals, Inc., Marcus Hook, Pa., Houdry Div., Office of Air and Waste Management Contract 68-02-0255, Rept. EPA-450/3-73-006-b, 103p., Feb. 1975. 22 refs.

NTIS: PB 240986/AS

A survey of the petrochemical industry was performed to make an engineering and cost analysis of air pollution control for acrylonitrile manufacture. Components of the study included: a process and industry description, an engineering description of available emission control systems, the cost of these systems, the financial impact of emission control on the industry, air episode procedures, and plant inspection procedures. The primary air contaminants emitted from acrylonitrile manufacture are hydrocarbons, carbon monoxide, and, to a lesser extent, nitrogen oxides. The inclusion of absorber vent gas incinerators in all existing and future plants was estimated to reduce total air emissions from the industry to about 40 million lbs/yr in 1985, i.e., about 0.01 lbs/lb of acrylonitrile. The capital cost for the installation of a thermal incinerator on the absorber vent of a typical operation was estimated at \$350,000, with an additional \$410,000 being required to add a waste heat boiler to the system. An annual operating cost of \$136,000 was projected for a single incinerator.

51937

APTIC NO. 73713

Miyamoto, Takashi

ESTIMATES OF ECONOMIC LOSSES CAUSED BY ENVIRONMENTAL POLLUTION. In: *Annual Report of the Tokyo Metropolitan Research Institute for Environmental Protection*, p. 75-86, 1975.

Economic losses resulting from all types of environmental pollution in Japan were calculated from surveys conducted from 1970-1973. Costs were tabulated in terms of property damage and repair, additional maintenance expenses, and medical expenses. The total annual economic loss due to air pollution (public, business, and household sectors) was an estimated

EFFECTS-ECONOMIC

51943

\$450 million 1972 prices) as compared to \$3 billion for economic losses resulting from all types of pollution. Families having pollution-related diseases showed larger medical expenditures than other families, while the leisure expenditures of the former were smaller. Families with pollution-related disease also showed a higher deficit livelihood (42.9%) as compared with other families (15.5%).

1974

51938

APTIC NO. 73710

Freeman, A. Myrick, III.

AIR POLLUTION AND PROPERTY VALUES: A FURTHER COMMENT. *Rev. Econ. Statist.*, 56(4):554-556, 1974. 6 refs.

Mathematical functions for relating air pollution effects to property values are discussed. The application of some simple analytics of supply, demand, and household equilibrium provides a model in which the relationship between property values and air quality represents an opportunity locus or a sort of supply curve for households, rather than being a demand curve for clean air. Despite this interpretation of the property/value air quality relationship, the aggregate marginal willingness to pay for air quality improvement can be estimated directly from this information; however, the benefits of non-marginal changes in air quality can not in general be determined without more information on the shape of the marginal-willingness-to-pay curve. The rent function, which is an unresolved question in terms of its interpretation as a demand curve, is an opportunity locus for households; and its slope, the marginal purchase price function, is a locus of the equilibrium marginal willingnesses of all households to pay.

51939

APTIC NO. 75353

Hinton, M. G., J. Meltzer, T. Iura, J. A. Drake, L. Forrest, B. Siegel, C. Speisman, and H. M. White

MEDIUM DUTY VEHICLE EMISSION CONTROL COST EFFECTIVENESS COMPARISONS. VOLUME II - TECHNICAL DISCUSSION (FINAL REPORT). Aerospace Corp., El Segundo, Calif., Environmental Programs Group, Environmental Protection Agency Contract 68-01-0417, ATR-74(7327)-1, Rept. EPA-460/3-74-004-b, 235p., Jan. 1974. 49 refs.

NTIS: PB 242247/AS

A comparative analysis of the emission control cost factors (expressed as dollars expended per ton of pollutant removed) for medium duty vehicles (6000-14,000 lb), light duty vehicles (less than 6000 lb), heavy duty vehicles (greater than 14,000 lb), and various stationary sources emitting carbon monoxide, hydrocarbons, and nitrogen oxides was performed. Mobile source emission inventories were also calculated for the New York City, Los Angeles, and Phoenix-Tucson Air Quality Control Regions. Emission control cost factors generally decrease in numerical value as the vehicle weight increases; this same size effect was also noted for stationary sources. Stationary sources, however, showed lower control cost factors than smaller mobile sources for the same pollutant specie.

51940

APTIC NO. 75354

Hinton, M. G., J. Meltzer, T. Iura, J. A. Drake, L. Forrest, B. Siegel, C. Speisman, and H. M. White

MEDIUM DUTY VEHICLE EMISSION CONTROL COST EFFECTIVENESS COMPARISONS. VOLUME I - EXECUTIVE SUMMARY (FINAL REPORT). Aerospace Corp., El Segundo, Calif., Environmental Programs Group, Environmental Protection Agency Contract 68-01-0417, ATR-74(7327)-1, Rept. EPA-460/3-74-004-a, 56p., Jan. 1974. 1 ref.

NTIS: PB 242246/AS

A comparative analysis of emission control cost factors (expressed as dollars expended per ton of pollutant removed)

for medium duty vehicles (6000-14,000 lb), light duty vehicles (less than 6000 lb), heavy duty vehicles (greater than 14,000 lb), and various stationary sources of carbon monoxide, hydrocarbons, and nitrogen oxides was performed. Mobile source emission inventories were calculated for the New York City, Los Angeles, and Phoenix-Tucson Air Quality Control Regions. Emission control cost factors generally decreased in numerical value as the vehicle weight increased; the same size effect was noted in stationary source cost factor comparisons. Stationary sources exhibited lower control cost factors than smaller mobile sources for the same pollutant specie.

51941

APTIC NO. 75350

Meltzer, J., M. G. Hinton, T. Iura, A. Burke, L. Forrest, W. M. Smalley, and F. Augustine

A REVIEW OF CONTROL STRATEGIES FOR IN-USE VEHICLES (FINAL REPORT). Aerospace Corp., El Segundo, Calif., Environmental Programs Group and Environmental Protection Agency, Ann Arbor, Mich., Emission Control Technology Div., Office of Air and Waste Management Contract 68-01-0417, ATR-74(7328)-1, Rept. EPA-460/3-74-021, 239p., Dec. 1974. 82 refs.

NTIS: PB 241768/AS

A cost-effectiveness analysis of various approaches to reducing air pollutant emissions from automobiles currently in use is presented. Inspection/maintenance approaches can reduce hydrocarbon and carbon monoxide emissions by 0.475-0.062 and 4.8-5.4 g/mi, respectively, at a cost effectiveness of 0.63-1.12 and 0.071-0.111 \$/lb of pollutant, respectively, for controlled vehicles. Retrofit approaches involving engine operation modifications or catalytic afterburners can reduce hydrocarbon and carbon monoxide emissions by 0.72-3.36 and 30.0-39.0 g/mi, respectively, at a cost-effectiveness of 0.47-0.62 and 0.01-0.10 \$/lb of pollutant, respectively, for controlled vehicles. Conversion to gaseous fuels can reduce hydrocarbon and carbon monoxide emissions by 2.70-3.10 and 45.0-54.0 g/mi, respectively, at a cost-effectiveness of 2.05-3.33 and 0.08-0.14 \$/lb of pollutant, respectively. Emission reductions and cost-effectiveness values are also given for uncontrolled vehicles (pre-1968).

51942

APTIC NO. 74190

Schwarz, H. and D. Elsinghaus

QUANTIFICATION OF THE ECONOMIC IMPACTS OF NEW TECHNOLOGIES. (Probleme der Quantifizierung volkswirtschaftlicher Wirkungen neuer Technologien). Text in German. VDI (Ver. Deut. Ingr.) Ber., no. 224:143-153, 1974. 14 refs.

An input-output model for the quantification of the economic impacts of new technologies and substitutions is presented through the example of the Stirling engine. The development of new transportation systems, just as that of other technologies, is influenced by technical, economical, social, and ecological relationships with multiple feedbacks. Thus, public interest and awareness of environmental problems induces a pressure after a certain time which results, as a first step, in an increased readiness to appropriate funds for related research and development programs. The gradual accumulation of knowledge on environmental problems in the course of this process also increases the awareness of environmental damages, which incites further public interest.

51943

APTIC NO. 73846

Schweppe, F. C., D. H. Marks, D. L. Farrar, J. Gruhl, M. F. Ruane, P. F. Shiers, and F. Woodruff, Jr.

ECONOMIC-ENVIRONMENTAL SYSTEM PLANNING. Preprint, The Inst. of Electrical and Electronics Engineers, Inc. Power Engineering Society, New York, Power System Engineering Committee, 28p., 1974. 49 refs. (Presented at IEEE (Institute of Electrical and Electronics Engineers) Power Engineering Society 1974 Summer Meeting and Energy Resources Conference, July 19, 1974.)

A computerized model for the economic-environmental system-planning of steam electric power plants is described. The program generates hypothetical expansion patterns along with a production-costing simulator to develop generation expansion schemes that are tested for economic performance, load-meeting reliability, compliance with environmental legislation, and land, energy, and water consumptions. One component of the scheme is a composite model that describes the sulfur dioxide and particulate air pollution characteristics of a fossil-fueled steam electric plant for various types of fuel, boiler operation, and control methods. The operating and cost data related to plant air pollution abatement are calculated with parameterized abatement and plant boiler models. A site evaluation air model can be used as part of a larger system-planning scheme or can be used to perform sensitivity tests of factors affecting the air pollution performance of plants.

51944

APTIC NO. 73962

California Air Resources Board, Sacramento, Calif., Land Use Planning Program

ECONOMIC ANALYSIS FOR THE LAND USE PLANNING PROGRAM (STAFF REPORT). *Dept. of Housing and Urban Development Grant CPA 1032.207, CPA-CA-09-39-1032, 22p., July 1974, 3 refs.*

NTIS: PB 237866

The feasibility of conducting a cost-benefit analysis of the California Air Resources Board Land Use Planning Program is analyzed as well as means for increasing the effectiveness of information dissemination. A careful articulation of some of the major costs and benefits associated with the LUPP is recommended, though a complete cost-benefits analysis is not. Such an analysis is currently subject to special problems beyond the normal difficulties associated with the value quantification of public projects. The effectiveness of LUPP information can be determined by assessing its usefulness to other agencies. General interest in the land use/transportation/air quality area can also be evaluated by analyzing the 1972 American Society of Planning Officials questionnaire results for California cities.

1973

51945

APTIC NO. 72010

Ayres, Robert U. and Stedman Noble

ECONOMIC IMPACT OF MASS PRODUCTION OF ALTERNATIVE LOW EMISSIONS AUTOMOTIVE POWER SYSTEMS (EXECUTIVE SUMMARY). In: *Decision of the Administrator of the Environmental Protection Agency Regarding Suspension of the 1975 Auto Emission Standards, Part IV, 93rd Congress (Senate), First Session, Serial 93-H9, p. 1-32, June 26-27, 1973. (Hearings Before the Subcommittee on Air and Water Pollution of the Committee on Public Works.) (Dept. of Transportation Rept. DOT-OS-20003-ES)*

The economic impact resulting from the conversion from the presently used spark ignition Otto-cycle engine to one of two pre-specified low emissions alternative power plants (a hypothetical regenerative free turbine or several alternate designs of a hypothetical Rankine cycle engine) is analyzed. A major technological change in the automobile power plant appears feasible within a decade. The economic sectors most strongly affected over the long run are petroleum refining and fuel distribution. For a standard-sized sedan, doubling the cost of the power plant is estimated to add about 12% onto the retail price of the car. The impact of fuel costs fuel taxes on users is roughly comparable to the impact of depreciation and finance charges. The capital resources available to the automobile manufacturing industry appear ample to finance the conversion. For technological changes involving additional uses of rare metals, time may have to be allowed to secure reliable long-term sources of supply.

146

STANDARDS AND CRITERIA

1975

51946

APTIC NO. 74093

Ikegami, Minoru

ENVIRONMENTAL COUNTERMEASURE AND JIS.

(*Kankyo taisaku to JIS*). Text in Japanese. *Bunseki Kiki (Analysis Instr.)*, 13(4):237-252, April 1975.

The general status of environmental pollution and the operational mechanism of pollution countermeasures are discussed. For air pollution, the environmental standard and emission standard of sulfur dioxide, carbon monoxide, suspended particulate, nitrogen dioxide and oxidant are given. For water pollution, the environmental standard and emission standard of pollutants affecting human health such as cadmium, cyan, organic phosphorus, lead, chromium, arsenic, total mercury, and alkyl mercury and pollutants concerning living environmental protection such as pH, BOD (biological oxygen demand), SS, and DO in lake, river, and ocean are given. The measurement method for these pollutants are standardized by JIS (Japan Industrial Standards) for the unification and simplification of measurement. The list of JIS measurement methods for the environmental pollutants as of Dec. 1974 are given. The organization process for industrial standardization is described. The 1975 automotive exhaust gas emission standard, and JIS measurement methods are also given. The recent trend in pollution measurement instrumentation and future trends in pollution related JIS are also discussed.

51947

APTIC NO. 75189

Walsh, George W.

EMISSION STANDARDS FOR PARTICULATES. *Environmental Protection Agency, Washington, D. C., Office of Research and Development, Symp. Electrostat. Precipitators Control Fine Part., Research Triangle Park, N. C., 1975, p. 13-16, EPA-650/2-75-016.*

NTIS: PB 240440/AS

The relationship between emission standards and the control of fine particulates is discussed. Standards of performance for particulates, although written for total particulates, also tend to control fine particulates prior to the adoption of National Ambient Air Quality Standards. A limit does exist, however, beyond which standards of performance cannot progress unless costs of control are reduced or a specific regulatory program for fine particulates is initiated. Another factor which limits fine particulate control is the ability to predict collector performance. This predictive capability is important in utilizing technology transfer from one industry to another and in setting standards for emerging industries where existing plants are not available for study.

51948

APTIC NO. 73850

Canadian Air Pollution Control Directorate, Publications Section

ASPHALT PAVING INDUSTRY NATIONAL EMISSION GUIDELINES. *Can. Gaz., Part 1:1284-1287, April 5, 1975.*

Canadian national emission guidelines relating to particulate emissions from plants producing asphalt concrete are presented. The amount of particulate matter emitted into the ambient air is not to exceed 0.230 g/normal cu m (measured dry and undiluted for the exhaust gases) as of April 1, 1975 for new plants and April 1, 1976 for existing plants. The maximum plume opacity permitted is 20% (equivalent to a Ringelmann number 1); where the presence of uncombined water, however, is the only reason for failure to meet the opacity requirement, the failure is not considered to be a violation. Procedures for emission testing and emission data record keeping are also specified.

STANDARDS AND CRITERIA

51954

51949

APTIC NO. 74681

Environmental Agency (Japan)

EXPLANATORY GUIDANCE FOR 1976 AUTO EMISSION STANDARD. (*Jidosha haishutsu gasu Showa 51 nendo kisei setsumei shiryō*). Text in Japanese. 8p., Feb. 1975.

In the 1976 automotive exhaust gas emission control regulations, the nitrogen oxides emission standard for new passenger vehicles was tightened, and the hydrocarbon emission standard at idling for the existing freight cars was also revised. The NOx emission standards were set to be in the range of 0.5 to 3.2 depending on the vehicle size, requiring 0-50% reduction compared to those of 1975. The allowable HC emission concentration at idling was set at 7800 ppm for two-cycle engines 3300 ppm for special engines, and 1200 ppm for others. The 1976 emission standards are compared with the present emission standard by vehicle type, size, and driving mode. The pollution control measures recommended for the achievement of 1976 emission standards are exhaust gas recirculation, ignition time control, catalytic reactors, CVCC engines, rotary engines and thermal reactors. A description of the 10-mode measurement method is also given.

51950

APTIC NO. 74132

Hyogo Prefectural Government (Japan), Div. of Environmental Pollution

PRESENT SITUATION OF AIR POLLUTION AND POLICIES TAKEN FOR ENVIRONMENTAL POLLUTION CONTROL. (*Kankyo osen no genkyo oyobi osen boshi ni kanshite kojita shisaku*). Text in Japanese. In: *Hyogo Prefectural white Paper on the Environment in 1974*. p. 13-72, 1975.

Data on atmospheric pollution obtained at 55 measuring points in Hyogo Prefecture during 1973 are compiled and analyzed in relation to new environmental standards issued in May 1973. The new standards for sulfur dioxide are 0.04 ppm for the daily average value and 0.1 ppm for the 1-hour value. Relatively higher concentrations of SO2 were observed in July and August of 1973 due to the stable, dry, and hot weather; the ambient SO2 concentration was markedly reduced in the winter. The new standard for nitrogen oxides is 0.02 ppm for the daily average value, which is to be attained within 5 yr. Only one measuring station met the new standard during 1973. The number of forecasts (45) and warnings (28) of smog showed an increasing trend.

51951

APTIC NO. 75134

Environmental Protection Agency, Seattle, Wash., Regional Office X and TRW, Inc., Redondo Beach, Calif., Environmental Services

IMPLEMENTATION PLAN REVIEW FOR IDAHO AS REQUIRED BY THE ENERGY SUPPLY AND ENVIRONMENTAL COORDINATION ACT. *Office of Air and Waste Management Contract 68-02-1385, Rept. EPA-450/3-75-011*, 61p., March 1975. 11 refs.

NTIS: PB 241 621/AS

A review of Idaho's implementation plan was made in compliance with the Energy Supply and Environmental Coordination Act of 1974 to determine if sulfur dioxide and total suspended particulate regulations for stationary fuel combustion sources are overly restrictive. Sulfur dioxide fuel combustion emission regulations may be revised in the Idaho and Metropolitan Boise Air Quality Control Regions without jeopardizing the attainment and maintenance of NAAQS. The emission regulations for SO2 also appear to be overly restrictive for most of the area within the Eastern Idaho and Eastern Washington-Northern Idaho AQCRs. Particulate fuel combustion emission regulations do not appear to be overly restrictive in any of the four Idaho AQCRs. Air quality data and emissions inventory data for the state are presented in appendices.

51952

APTIC NO. 75135

Environmental Protection Agency, Philadelphia, Pa., Regional Office III, Office of Air and Waste Management, Research Triangle Park, N. C., Office of Air Quality Planning and Standards, and TRW, Inc., Vienna, Va., Environmental Services

IMPLEMENTATION PLAN REVIEW FOR DISTRICT OF COLUMBIA AS REQUIRED BY THE ENERGY SUPPLY AND ENVIRONMENTAL COORDINATION ACT (FINAL REPORT). *Office of Air and Waste Management Contract 68-02-1385, Rept. EPA-450/3-75-039*, 39p., March 1975.

NTIS: PB 241 626/AS

A review of the implementation plan for the District of Columbia in compliance with the Energy Supply and Environmental Coordination Act of 1974 was made to determine if sulfur dioxide and total suspended particulate regulations for stationary fuel combustion sources are overly restrictive. National Ambient Air Quality Standards for both pollutants were exceeded during 1973, indicating that the current emission regulations are not overly restrictive. Air quality data for 1973 are summarized along with emissions data obtained from the 1973 Regional Emissions Inventory compiled by the Metropolitan Washington Council of Governments.

51953

APTIC NO. 75340

Environmental Protection Agency, Atlanta, Ga., Regional Office IV, Argonne National Lab., Ill., Energy and Environmental Systems Div., Office of Air and Waste Management, Research Triangle Park, N. C., Office of Air and Quality Standards

IMPLEMENTATION PLAN REVIEW FOR SOUTH CAROLINA AS REQUIRED BY THE ENERGY SUPPLY AND ENVIRONMENTAL COORDINATION ACT. *Office of Air and Waste Management Interagency Agreement EPA-IAG-D5-0463, Rept. EPA-450/3-75-031*, 20p., March 1975.

NTIS: PB 241932/AS

A review of South Carolina's implementation plan to determine if total suspended particulate and sulfur dioxide regulations for stationary fuel combustion sources are overly restrictive is presented in compliance with the Energy Supply and Environmental Coordination Act of 1974. High particulate readings are being recorded throughout most of the state, and there does not appear to be any room for relaxing particulate regulations. No SO2 violations of the National Ambient Air Quality Standards are reported for the state, and it appears that the state can tolerate higher SO2 emissions without ambient air quality problems. Power plant modeling results indicate that some facilities can use higher sulfur fuel than is currently permitted; however, there are no clean fuels savings that would result from regulation revision. (Author summary modified)

51954

APTIC NO. 75342

Environmental Protection Agency, San Francisco, Calif., Regional Office IX, TRW, Inc., Redondo Beach, Calif., and Office of Air and Waste Management, Research Triangle Park, N. C., Office of Air Quality Planning and Standards

IMPLEMENTATION PLAN REVIEW FOR CALIFORNIA AS REQUIRED BY THE ENERGY SUPPLY AND ENVIRONMENTAL COORDINATION ACT. *Office of Air and Waste Management Contract, Rept. EPA-450/3-75-045*, 7p., April 1975.

NTIS: PB 241935/AS

A review of California's implementation plan to determine if stationary fuel combustion source regulations for total suspended particulates, sulfur dioxide, and nitrogen oxides are overly restrictive is presented in compliance with the Energy Supply and Environmental Coordination Act of 1974. High total suspended particulate levels are jeopardizing the attain-

ment of National Ambient Air Quality Standards in seven Air Quality Control Regions of the state, and there appears to be little potential for the revision of particulate fuel combustion emission regulations in any of California's AQCRs. Sulfur dioxide emission regulations also do not appear to be overly restrictive. The only AQCR in the state which shows even the slightest potential for revision of the SO₂ fuel combustion emission regulation is San Diego; however, since the major sources of SO₂ in this area are power plants, changes to current regulations might greatly affect the local air quality. The Metropolitan Los Angeles AQCR is currently experiencing violations of the nitrogen dioxide air quality standard and therefore shows little potential for revision of NO_x fuel combustion emission regulations. Insufficient data for the remaining 10 AQCRs preclude a determination of the restrictiveness of NO_x regulations.

51955

APTIC NO. 75348

Environmental Protection Agency, Boston, Mass., Regional Office I, TRW, Inc., Vienna, Va., Environmental Services and Office of Air and Waste Management, Research Triangle Park, N. C., Office of Air Quality Planning and Standards

IMPLEMENTATION PLAN REVIEW FOR RHODE ISLAND AS REQUIRED BY THE ENERGY SUPPLY AND ENVIRONMENTAL COORDINATION ACT (FINAL REPORT). *Office of Air and Waste Management Contract 68-02-1385, Rept. EPA-450/3-75-050, 40p., April 1975.*

NTIS: PB 242134/AS

A review of Rhode Island's implementation plan to determine if total suspended particulate and sulfur dioxide regulations for stationary fuel combustion sources are overly restrictive is presented in compliance with the Energy Supply and Environmental Coordination Act of 1974. National Ambient Air Quality Standards are being exceeded for both pollutants, suggesting little potential for revising fuel combustion source emission regulations. Air quality data and emission factors for significant contributors are presented in appendices.

51956

APTIC NO. 75355

Environmental Protection Agency, Atlanta, Ga., Regional Office IV, Argonne National Lab., Ill., Office of Air and Waste Management, Research Triangle Park, N. C., Office of Air Quality Planning and Standards

IMPLEMENTATION PLAN REVIEW FOR GEORGIA AS REQUIRED BY THE ENERGY SUPPLY AND ENVIRONMENTAL COORDINATION ACT. *Office of Air and Waste Management Interagency Agreement EPA-IAG-D5-0463, Rept. EPA-450/3-75-042, 23p., April 1975.*

NTIS: PB 242017/AS

A review of Georgia's implementation plan to determine if total suspended particulate and sulfur dioxide regulations for stationary fuel combustion sources are overly restrictive is presented in compliance with the Energy Supply and Environmental Coordination Act of 1974. There is little potential for revising particulate emission regulations in all of Georgia's Air Quality Control Regions, with the exception of the Augusta-Aiken and Northeast Georgia Intrastate AQCRs; a more detailed analysis of the air quality data for the Northeast Georgia AQCR is necessary, however, to determine the potential for regulation revision. All ACCRs in the state show the potential for relaxing SO₂ emission regulations. The necessity for regulation revision does not appear to exist, however, since present regulations allow for the consumption of up to 3% sulfur content fuel which is readily available. (Author summary modified)

51957

APTIC NO. 75356

Environmental Protection Agency, Chicago, Ill., Regional Office V, Argonne National Lab., Ill., Energy and Environmental System Div., and Office of Air and Waste

AIR POLLUTION ABSTRACTS, OCTOBER 1975

Management, Research Triangle Park, N. C., Office of Air Quality Planning and Standards

IMPLEMENTATION PLAN REVIEW FOR WISCONSIN AS REQUIRED BY THE ENERGY SUPPLY AND ENVIRONMENTAL COORDINATION ACT. *Office of Air and Waste Management Contract EPA-IAG-D5-0463, Rept. EPA-450/3-75-032, 56p., March 1975. 6 refs.*

NTIS: PB 241233/AS

A review of Wisconsin's implementation plan to determine if total suspended particulate and sulfur dioxide regulations for stationary fuel combustion sources are overly restrictive is presented in compliance with the Energy Supply and Environmental Coordination Act of 1974. High particulate levels or levels sufficiently close to the standards to permit only a small margin for increase are reported for all of the state's Air Quality Control Regions. Except in the Southeastern Wisconsin AQCR where small fuel combustion sources are prohibited from burning coal, the state particulate regulations do not prevent large sources from switching from oil or gas to coal since the particulate emission limits can be met with suitable control equipment. High particulate levels in Southeastern Wisconsin suggest that the existing regulations are not overly restrictive. There is a significant tolerance for increased SO₂ emissions in all AQCRs in Wisconsin, thus making conversion from clean fuels to coal feasible. Air quality data and emission factors for significant contributors are presented in appendices.

51958

APTIC NO. 75364

Environmental Protection Agency, Atlanta, Ga., Regional Office IV, Argonne National Lab., Ill., Energy and Environmental Systems Div., and Office of Air and Waste Management, Research Triangle Park, N. C., Office of Air Quality Planning and Standards

IMPLEMENTATION PLAN REVIEW FOR ALABAMA AS REQUIRED BY THE ENERGY SUPPLY AND ENVIRONMENTAL COORDINATION ACT. *Office of Air and Waste Management Interagency Agreement EPA-IAG-D5-0463, Rept. EPA-450/3-75-043, 22p., April 1975.*

NTIS: PB 241933/AS

A review of Alabama's implementation plan to determine if total suspended particulate and sulfur dioxide regulations for stationary fuel combustion sources are overly restrictive is presented in compliance with the Energy Supply and Environmental Coordination Act of 1974. Violations of the particulate National Ambient Air Quality Standards are reported in all regions except for the Alabama and Tombigbee Rivers Intrastate Air Quality Control Regions, and there appears to be little margin for relaxing particulate emission limiting regulations. Only a limited potential for clean fuel savings in the state exists with respect to sulfur dioxide regulations. Modeling results indicate a potential for SO₂ regulation revision in certain portions of the Tennessee River Valley-Cumberland Mountains Interstate AQCR; however, numerous air quality violations are recorded in this AQCR, and careful consideration must be given to the impact of a regulation revision on the regional air quality. (Author summary modified)

51959

APTIC NO. 75365

Environmental Protection Agency, Dallas, Tex., Region VI, TRW, Inc., Redondo Beach, Calif., Environmental Services and Office of Air and Waste Management, Research Triangle Park, N. C., Office of Air Quality Planning and Standards

IMPLEMENTATION PLAN REVIEW FOR ARKANSAS AS REQUIRED BY THE ENERGY SUPPLY AND ENVIRONMENTAL COORDINATION ACT. *Office of Air and Waste Management Contract 68-02-1385, Rept. EPA-450/3-75-010, 75p., April 1975. 12 refs.*

NTIS: PB 241930/AS

A review of the Arkansas implementation plan to determine if total suspended particulate and sulfur dioxide regulations for stationary fuel combustion sources are overly restrictive is

STANDARDS AND CRITERIA

51964

presented in compliance with the Energy Supply and Environmental Coordination Act of 1974. Air quality data indicate a widespread particulate problem throughout the state. There is no indication that SO₂ National Ambient Air Quality Standards are being violated; however, because the restrictiveness of the state's SO₂ regulations cannot be evaluated, it is not known if the low ambient SO₂ levels are the result of an overly restrictive control of emissions, a low sulfur content of the fuel used, or to some other factor such as meteorology. Overall, regulations for both pollutants do not appear to be overly restrictive. Data on air quality violations and emission factors for significant contributors are presented in appendices.

51960

APTIC NO. 75367

Environmental Protection Agency, Boston, Mass., Regional Office I, TRW, Inc., Environmental Services and Office of Air and Waste Management, Research Triangle Park, N. C., Office of Air Quality Planning and Standards

IMPLEMENTATION PLAN REVIEW FOR CONNECTICUT AS REQUIRED BY THE ENERGY SUPPLY AND ENVIRONMENTAL COORDINATION ACT (FINAL REPORT). Office of Air and Waste Management Contract 68-02-1385, Rept. EPA-450/3-75-051, 61p., April 1975. 10 refs.

NTIS: PB 242135/AS

A review of Connecticut's state implementation plan to determine if sulfur dioxide and total suspended particulate regulations for stationary fuel combustion sources are overly restrictive is presented in compliance with the Energy Supply and Environmental Coordination Act. Some potential appears to exist for revising current sulfur content regulations in the Eastern Connecticut and Northwestern Connecticut Intrastate Air Quality Control Regions as well as the particulate emission regulations in the Northwestern Connecticut AQCR. Air quality data and modeling results indicate that emission regulations in other regions of the state are not overly restrictive in terms of attaining and maintaining National Ambient Air Quality Standards. Air quality data and particulate and sulfur dioxide emission factors for significant contributors are presented in appendices.

51961

APTIC NO. 75371

Environmental Protection Agency, Denver, Colo., Regional Office VIII, TRW, Inc., Redondo Beach, Calif., Environmental Services and Office of Air and Waste Management, Research Triangle Park, N. C., Office of Air Quality Planning and Standards

IMPLEMENTATION PLAN REVIEW FOR WYOMING AS REQUIRED BY THE ENERGY SUPPLY AND ENVIRONMENTAL COORDINATION ACT. Office of Air and Waste Management Contract 68-02-1385, Rept. EPA-450/3-75-022, 39p., March 1975. 11 refs.

NTIS: PB 242307/AS

A review of Wyoming's implementation plan to determine if total suspended particulate and sulfur dioxide regulations for stationary fuel combustion sources are overly restrictive is presented in compliance with the Energy Supply and Environmental Coordination Act of 1974. Ambient levels for total suspended particulates exceeded the National Ambient Air Quality Standards in all Wyoming Air Quality Control Regions during 1973, and the Wyoming fuel burning particulate regulation does not appear to be overly restrictive. Sulfur dioxide levels are well below the NAAQS throughout the state, and a recently adopted Wyoming SO₂ emission regulation may be more restrictive than necessary to maintain NAAQS. Air quality data and emission factors for significant contributors are presented in appendices.

51962

APTIC NO. 75372

Environmental Protection Agency, Philadelphia, Pa., Regional Office III, TRW, Inc., Vienna, Va., Environmental

Services, Office of Air and Waste Management, Research Triangle Park, N. C., Office of Air Quality Planning and Standards

IMPLEMENTATION PLAN REVIEW FOR DELAWARE AS REQUIRED BY THE ENERGY SUPPLY AND ENVIRONMENTAL COORDINATION ACT (FINAL REPORT). Office of Air and Waste Management Contract 68-02-1385, Rept. EPA-450/3-75-040, 40p., March 1975. 1 ref.

NTIS: PB 242308/AS

A review of Delaware's implementation plan to determine if total suspended particulate and sulfur dioxide regulations for stationary fuel combustion sources are overly restrictive is presented in compliance with the Energy Supply and Environmental Coordination Act of 1974. National Ambient Air Quality Standards for both pollutants were exceeded in the Metropolitan Philadelphia Air Quality Control Region during 1973, making the region a poor candidate for emission regulation revisions. There were no violations of the NAAQS during 1973 in the Southern Delaware Air Quality Control Region; however, there are no modeling data available to determine if an increase in emissions can be tolerated without exceeding standards. Air quality data and emission factors for significant contributors are presented in appendices.

1974

51963

APTIC NO. 75167

Martin, Werner and Arthur C. Stern

THE WORLD'S AIR QUALITY MANAGEMENT STANDARDS. VOLUME I: THE AIR QUALITY MANAGEMENT STANDARDS OF THE WORLD, INCLUDING UNITED STATES FEDERAL STANDARDS (FINAL REPORT). North Carolina Univ., Chapel Hill, Dept. of Environmental Sciences and Engineering, Environmental Protection Agency Contract 68-02-0556, Program Element 1AA001, ROAP 26AA, Rept. EPA-650/9-75-001-a, 396p., Oct. 1974. 88 refs.

NTIS: PB 241875/AS

Air quality management regulations and standards for various countries throughout the world, including the United States, are tabulated. The standards relate to air quality, measurement methods, ground level concentrations, emergency procedures, emission levels, plant contamination, fuel composition, and stack height. Air quality management regulations that do not have numerical limits are excluded from the compilation. (Author abstract modified)

51964

APTIC NO. 75178

Martin, Werner and Arthur C. Stern

THE WORLD'S AIR QUALITY MANAGEMENT STANDARDS. VOLUME II: THE AIR QUALITY MANAGEMENT STANDARDS OF THE UNITED STATES (FINAL REPORT). North Carolina Univ., Chapel Hill, Dept. of Environmental Sciences and Engineering, Environmental Protection Agency Contract 68-02-0556, Program Element 1-AA001, ROAP 26AA, Rept. EPA-650/9-75-001-b, 385p., Oct. 1974. 2 refs.

NTIS: PB 241 876/AS

A compilation of Federal, state, and local air quality management standards in the United States is presented. The kinds of standards tabulated include: air quality standards, particulate and gaseous emission standards for industrial and non-industrial sources, emergency procedure concentrations, numerical design standards for fuel burning equipment, and fuel standards. Quasi-emission standards that set forth limits on specific pollutants in the ambient air at ground level as required by state or local regulations for use in diffusion computations to determine limits of emission from specific sources are also listed.

51965

APTIC NO. 74212

Yoshida, Katsumi

THE ENVIRONMENTAL CAPACITY AND THE TOTAL EMISSION CONTROL REGULATIONS. (Kankyo joryo to soryo kisei). Text in Japanese. Mie-ken Kogai Senta Nenpo (Mie Prefect. Pub. Nuisance Center Annu. Rep.), no. 2:1-6, March 1974.

Environmental pollution in Japan is discussed in relation to control strategies. A shift in regulator emphasis from permissible individual emission levels to permissible total emission is proposed. Regional planning, possibly with the aid of electronic simulation, may also be necessary. Total emission regulation implies a tolerated amount of emission. Taxes on emissions may be necessary to achieve the desired level of control.

51966

APTIC NO. 73834

Itami Municipal Office (Japan)

ENVIRONMENTAL STANDARDS OF AIR POLLUTION.

(Taiki osen no kankyo kijun). Text in Japanese. In: Kogai no Gaikyo 49 nenban (General Condition of the Environmental Pollution), p. 14-15, Dec. 1974.

The environmental standards and target dates (notification date: May 16, 1973 for sulfur dioxide and May 8, 1973 for others) are as follows: SO₂, daily average of 1-hour value 0.04 ppm, one-hour value 0.1 ppm, and within 5 yr; carbon monoxide, daily average of 1-hour value 10 ppm, 8-hour average of 1-hour value 20 ppm, and earliest possible time; suspended particulates, daily average of 1-hour value 0.1 mg/cu m, 1-hour value 0.20 mg/cu m, and earliest possible time; nitrogen dioxide, daily average of 1-hour value 0.02 ppm and within 5 or maximum 8 yr, and oxidant, 1-hour value 0.06 ppm and earliest possible time. The air pollution monitoring system of Itami city consists of two air pollution monitoring stations where sulfur oxides, nitrogen oxides, oxidant, and suspended particulate concentrations and wind direction and wind velocity are measured, one automotive exhaust gas monitoring station where CO and NO_x are measured, six measuring points where SO_x and falling particulates are measured, and mobile monitoring units for the measurement of SO_x, suspended particulate, CO, NO_x, total hydrocarbons and oxidant concentrations and wind direction and wind velocity.

51967

APTIC NO. 74107

Environmental Agency (Japan), Bureau of Air Quality

ON TIME SCHEDULE FOR ACHIEVING ENVIRONMENTAL STANDARDS FOR NITROGEN DIOXIDE.

(Nisanka chisso ni kakaru kankyo kijun no tassei kikan ni tsuite). Text in Japanese. 4p., July 1974.

The text of an order (No. 227, July 12, 1974), issued by the Director of the Bureau of Air Quality, Japan Environmental Agency, is reproduced. Twelve prefectures with heavily populated and/or heavily industrialized regions, where attaining atmospheric nitrogen dioxide standards by 1978 is difficult or impossible, have been granted time until 1981 to reach the final standards in those regions. Interim environmental standards (maintaining NO₂ environmental standards at least 60% of the time throughout the entire year) should be met in 5 yr. The twelve prefectures are: Hokkaido, Saitama, Chiba, Tokyo, Kanagawa, Aichi, Kyoto, Osaka, Hyogo, Okayama, Hiroshima, and Fukuoka.

51968

APTIC NO. 74109

Osaka Prefecture, Div. of Life Environment (Japan)

DATA PERTAINING TO ESTABLISHMENT OF REGULATIONS ON EMISSION STANDARDS ACCORDING TO PROVISIONS OF ATMOSPHERIC POLLUTION CONTROL LAW, ARTICLE 4, ITEM 1, AND ON WASTE WATER STANDARDS ACCORDING TO PROVISIONS OF WATER QUALITY DETERIORATION CONTROL LAW, ARTICLE 3, ITEM 3. (Taiki osen boshiho Dai 4-jo, Dai 1-ko no kitei ni yoru haishutsu kijun oyobi suishitsu odaku boshiho Dai 3-jo, Dai 3-ko no kitei

ni yoru haishutsu kijun o Jameru jorei no kansuru shiryō). Text in Japanese. 25p., Feb. 1974.

The atmospheric emission (smoke) standards and waste water quality standards established by Osaka Prefecture, Japan, in accordance with key provisions of the Atmospheric Pollution Control Law (Law 97, 1968) and the Water Quality Deterioration Control Law (Law 138, 1970), are listed in tabular form. These standards are more stringent than those established by Law 97 and Law 138, and go into effect in 1974, with some extensions granted to 1976, for attaining waste water standards. Smoke emission standards are determined by maximum volume of exhaust gas emission per hour from the source (under 10,000 cu m; under 40,000 cu m; over 40,000 cu m corrected to O C and one atmosphere pressure) and by type of fuel (coal; heavy oil or other liquid fuel; and gas). Temporary excesses (not over 6 min/hr) in emission during ignition and cleaning procedures are not included in the effective emission levels. Allowable weights of smoke particulates per 1 cu m of exhaust gas range from 0.05 g to 0.40 g. Industrial waste water standards apply to five water basins and one coastal construction area. Waste water standards are also established from human waste and residential sewage treatment plants in Osaka Prefecture. For all types of waste water the range of pH is 5.8-8.6. Other water pollutant standards vary with data of plant construction (for industry), and type of treatment installation and population density (for residential sewage and human waste). The average daily BOD (biological oxygen demand) and SS vary from 20-120 mg/l, with allowable maximum of 150 mg/l for some industries. Average daily coliform count should be 3000 colonies/cu cm in industrial waste water. Cyanides and organic phosphorus compounds are not to be present in industrial waste water in analyzable amounts. Other controlled substances are cadmium, lead, chromium, arsenic, zinc, soluble iron and manganese, fluorine, phenol, and n-hexane extracts.

51969

APTIC NO. 75254

Environmental Protection Agency, Kansas City, Mo., Regional Office VII and TRW, Inc., Redondo Beach, Calif., Environmental Services and Office of Air and Waste Management, Research Triangle Park, N. C., Office of Air Quality Planning and Standards

IMPLEMENTATION PLAN REVIEW FOR KANSAS AS REQUIRED BY THE ENERGY SUPPLY AND ENVIRONMENTAL COORDINATION ACT (FINAL REPORT). Office of Air and Waste Management Contract 68-02-1358, Rept. EPA-450/3-74-076, 76p., Dec. 1974. 12 refs.

NTIS: PB 241797/AS

A review of the Kansas implementation plan to determine if total suspended particulate and sulfur dioxide regulations for stationary fuel combustion sources are overly restrictive is presented in compliance with the Energy Supply and Environmental Coordination Act of 1974. Air monitoring data indicate that total suspended particulate pollution is a widespread problem throughout the state, although fuel combustion is a minor contributor in many areas. Current SO₂ levels are very low in outside Kansas, with somewhat higher levels in Wichita and Kansas City. The possibility exists, however, that National Ambient Air Quality Standards for SO₂, at least in Kansas City, may be violated if all fuel sources emit exactly at the Kansas SO₂ regulation. In other Air Quality Control Regions, NAAQS may not be violated if fuel switching occurs. Since some fuel switching can occur without regulation change, revision of the Kansas SO₂ emission regulation is not recommended. Neither the particulate nor the SO₂ regulations appear to be overly restrictive. Air quality data and emission factors for significant contributors are presented in appendices.

51970

APTIC NO. 75321

Federal Government of West Germany

FIRST ORDER FOR IMPLEMENTING FEDERAL POLLUTION CONTROL LAW (ORDER GOVERNING FURNACES - I. BIMSCHV) AND SECOND ORDER FOR

LEGAL AND ADMINISTRATIVE

51975

IMPLEMENTING THE FEDERAL POLLUTION CONTROL LAW (ORDER ON CHEMICAL TREATMENT PLANTS - 2. BIMSCHV). *Bundesgesetzblatt*, no. 103, Sept. 3, 1974. Translated from German. Leo Kanner Associates, Redwood City, Calif., 21p., Jan. 1975.

Federal regulations for controlling smoke emissions from furnaces fired with solid and liquid fuels and trichloroethylene or perchloroethylene emissions from chemical cleaning plants in West Germany are outlined. Emissions from chemical cleaning plants must not exceed 30 cu cm/cu m for trichloroethylene or perchloroethylene. Furnaces must be operated so that the smoke plume produced is lighter than a Ringelmann number 2 value. Further requirements, the granting of exceptions, enforcement procedures, transitional provisions, the suspension of regulations, and methods for making emission measurements are also covered.

51971

APTIC NO. 75382

Environmental Protection Agency, Chicago, Ill., Regional Office V, Argonne National Lab., Ill., Energy and Environmental Systems Div., and Office of Air and Waste Management, Research Triangle Park, N. C., Office of Air Quality Planning and Standards.

IMPLEMENTATION PLAN REVIEW FOR INDIANA AS REQUIRED BY THE ENERGY SUPPLY AND ENVIRONMENTAL COORDINATION ACT (FINAL REPORT). Office of Waste and Management Contract EPA-IAG-D5-0463. Rept. EPA-450/3-74-066, 76p., Dec. 1974. 5 refs.

NTIS: PB 242537/AS

A review of Indiana's implementation plan to determine if total suspended particulate and sulfur dioxide regulations for stationary fuel combustion sources are overly restrictive is presented in compliance with the Energy Supply and Environmental Coordination Act of 1974. There is little tolerance throughout the state for increased particulate emissions and hence relaxed particulate emission regulations. A substantial margin for increased SO₂ emissions exists in all regions except Chicago and Cincinnati, and significant clean fuel savings can be effected in all regions except these two. Any change in particulate or SO₂ regulations in the Chicago Air Quality Control Region must be considered in light of the impact on nitrogen oxide emissions, and there is little possibility that NO_x emissions can be increased without hampering the attainment of National Ambient Air Quality Standards. Air quality data and emission factors for significant contributors are presented in appendices.

LEGAL AND ADMINISTRATIVE

1975

51972

APTIC NO. 74283

Elston, John and Daniel Cowperthwait

NEW JERSEY'S AUTO EMISSION INSPECTION PROGRAM: AN ASSESSMENT OF ONE YEAR'S MANDATORY OPERATION. Preprint, *Air Pollution Control Assoc.*, Pittsburgh, Pa. 21p., 1975. 22 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-42.3.)

The various evaluation criteria and studies employed to assess New Jersey's auto emission inspection program's effectiveness are described. Since February 1, 1974, New Jersey's inspection/maintenance program has required mandatory maintenance for emission-rejected vehicles. For the first year's standard, 3.69 million vehicles were tested; almost 440,000 vehicles (11.72%) were rejected for emissions. Monthly trends in inspection failure rates are shown for vehicles rejected initially and upon reinspection. Further, spot check surveillance data specify idle test carbon monoxide (CO) and hydrocarbons

(HC) emissions by vehicle model year and engine family. The relationship of vehicle emissions inspection and compliance with federal Clean Air Act provisions regarding emission control device tampering is analyzed. Cost data for emission control repairs is presented and a regulatory variance founded upon repair cost and vehicle age is suggested. Environmental inspection test factors and their effect on idle emissions is investigated. Trend indicators of CO air quality are examined in relation to motor fuel consumption, the Federal Motor Vehicle Control Program (FMVCP) and New Jersey's idle emission inspection program. A downward trend in the number of ambient CO standard contraventions is apparent. The improvement is greater than from the FMVCP alone. Ambient hydrocarbon levels have not as yet shown a decline. (Author abstract modified)

51973

APTIC NO. 74281

Hoffman, David W., Harold J. Paulus, and David P. Lingo

AN EVALUATION OF AIR QUALITY MONITORING FOR FOSSIL-FUEL POWER PLANTS IN A REGIONAL POWER SYSTEM. Preprint, *Air Pollution Control Assoc.*, Pittsburgh, Pa., 14p., 1975. 5 refs. (Presented at the Air Pollution Control Association Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-45.4.)

The results of a cooperative study of air quality monitoring strategies in the upper Midwest by the Mid-Continent Area Power Pool (MAPP) Environmental Committee and the School of Public Health of the University of Minnesota are presented. In order to evaluate the entire region, a questionnaire was developed and distributed to all MAPP utilities operating fossil-fuel power plants. Parameters studied include relationships among factors such as capacity of fossil-fuel power plants, stack heights, methods of sampling, site selection, and monitoring expenses. (Author conclusions modified)

51974

APTIC NO. 73862

Owen, Auburn E., Jr. and Roy May

AMBIENT MONITORING AT TENNESSEE VALLEY AUTHORITY POWER PLANTS. Preprint, *Air Pollution Control Assoc.*, Pittsburgh, Pa., 11p., 1975. 7 refs. (Presented at the Air Pollution Control Association, St. Louis Section, Specialty Conference on Continuous Monitoring of Stationary Air Pollution Sources, St. Louis, Mo., March 20-21, 1975.)

The Tennessee Valley Authority's ambient air quality monitoring system around its coal-fired power plants is described. Ambient levels of sulfur dioxide are measured by both conductivity and coulometry, though conductimetric monitors are to be replaced by coulometric monitors approved by the Environmental Protection Agency. Meteorological and ambient SO₂ monitoring are coordinated to control operation of the power plants so that ambient air quality meets state and Federal standards. Standard high-volume samplers are used to collect suspended particulates, and polyethylene sampling gauges are used for the collection of settled particulates. All samples of suspended particulates that exceed the national primary standard and some samples collected near urban areas that exceed the secondary standard are evaluated for fly ash content to assess the power plant contribution to the total concentration of particulates. Biological field inspections around each plant throughout the growing season identify and delineate any areas of pollution effects on vegetation. The latter results are correlated with ambient air quality data. (Author abstract modified)

51975

APTIC NO. 73841

Suzuki, Tadayoshi

ENVIRONMENTAL ASSESSMENT. (Kankyo asessumento). Text in Japanese. *Doro to Shizen (Road Nature)*, 2(3):3-6, winter 1975.

The concept of environmental assessment particularly road environmental assessment is discussed based on the environ-

tal pollution control basic laws issued in August 1972. The subjects discussed are the definition of public nuisance, effects of environmental pollution due to traffic (noise, vibration, automotive exhaust gas, insolation problems, damage to animals and plants, malodor, and water pollution), background of environmental pollution problems (creative activity by human beings, expansion of development, indifference to nature, and the limit of natural resources), bases for control measures (control on industrial development and consumer demand, change in structure of society, industry and city, and development and selection of items with less pollution problems), location of responsibility for control measures (individual, developer, environmental control office, nation, and municipal office), and the planning process of environmental assessment (selection process and analytical approach, development of analytical techniques for factors and their correlation, survey and monitoring, evaluation of results, environmental capacity, allowable concentration, degree of effect, merit-demerit, and checking of models).

51976

APTIC NO. 73704

Szczepanski, Charles Z.

AIR QUALITY CONSIDERATIONS IN HUD PROGRAMS AND THE RELATIONSHIP TO EPA ACTIVITIES.

Preprint, American Society of Planning Officials, Chicago, Ill., and Air Pollution Control Assoc., Pittsburgh, Pa., 19p., 1975. (Presented at the Long Term Maintenance of Air Quality Standards Conference, Chicago, Ill., Feb. 3-4, 1975.)

Requirements and guidelines relating to air quality considerations in Housing and Urban Development programs of community development are reviewed along with their relationship to Environmental Protection Agency activities. Topics covered include: the relationship of physical design and land use to air quality considerations, HUD air quality criteria, HUD standards for indoor and recreation areas, environmental regulations and legislation pertinent to the HUD program, and HUD environmental goals. The Community Development Block Grant Program, which provides annual funding for local community development programs, allows for a portion of the funds to be used for environmental studies that include air quality analysis and planning. The aim of HUD is to provide direct support in implementing existing EPA air quality standards and to utilize EPA research in assessing the total health effects in selected patterns of life as well as long-range exposures to high and low levels of pollution.

51977

APTIC NO. 73839

Ehime Prefectural Government (Japan), Div. of Life and Environment

ENVIRONMENTAL POLLUTION IN EHIME PREFECTURE IN 1974: AIR POLLUTION CONTROL MEASURE. (Ehime no kogai: taiki osen boshi taisaku). Text in Japanese. p. 41-78, 1975.

The environmental pollution monitoring, measurement, and control measures based on the Ehime Prefectural environmental control regulations issued in Oct. 1969 and revised in March and July 1971 are reviewed. The environmental standards for sulfur oxides, carbon monoxide, nitrogen oxides, suspended particulate, and oxidant are given. The administrative system for emission control regulations, emission control methods, and emission standards for emission sources and pollutants are described. The total emission quantity control method introduced in March 1974 for sulfur dioxide is described with characteristics of simulation calculation and simulation method. The emission source control for boilers and furnaces is discussed with statistical data. The data on fluorine, hydrogen fluoride, chlorine, hydrogen chloride, and hydrogen sulfide concentrations measured at emission sources are given. The environmental monitoring system, emergency communication system, and emergency procedures are also discussed. As for photochemical smog, the NO_x concentration is constantly monitored at emission sources and oxidant concentration is measured.

51978

APTIC NO. 73843

Shizuoka Prefectural Government (Japan)

OFFENSIVE ODOR. (Akushu). Text in Japanese. In: 49 nenban Kogai Hakusho (Environmental White Paper, 1974), p. 223-227, 1975.

The status of malodor pollution and malodor control measures taken in Shizuoka Prefecture are discussed. The malodor pollution showed definite regional characteristics primarily attributable to three nature of pollution sources in the area. Based on the malodor control law issued in June 1971, the control standards for specified regions were formulated by the Shizuoka Prefectural government. Six different combinations of concentration standards for ammonia (1-5 ppm), methyl sulfide (0.01-0.20 ppm), hydrogen sulfide (0.02-0.20 ppm), methyl mercaptan (0.002-0.010 ppm), and trimethylamine (0.005-0.070 ppm) are enforced in a total of 21 cities and counties. The description of six concentration standards is given with the map of the specified areas where three different concentration standards are enforced.

51979

APTIC NO. 74105

ORDER FROM PRIME MINISTER'S OFFICE ON THE PARTIAL AMENDMENT OF ENFORCEMENT PROVISIONS TO AIR POLLUTION CONTROL REGULATIONS. ORDER NO. 71. (Taiki osen boshio shiko kisoku no ichibu o kaisei suru sorifurei. Sorifurei Dai 71-go). Text in Japanese. Kankochō Kogaisenmon Shiryō (Public Nuisance Gaz.), 10(1):99-102, Jan. 1975.

The text of Order No. 71 from the Japan Prime Minister's Office, amending Air Pollution Control Law Enforcement Regulations (1971, Order No. 1, jointly issued by the Ministry of Health and Welfare and the Ministry of International Trade and Industry), is reproduced. The regulations concern the sulfur oxides emission from stationary sources under the total emission control law. The regulations define an equation to calculate the allowable amount of sulfur oxides emissions; based on the defined equation the areal emission rate can be calculated by taking local emission standards into consideration.

51980

APTIC NO. 74108

SUMMARY OF GOVERNMENT ORDINANCE FOR THE PARTIAL AMENDMENT OF AIR POLLUTION CONTROL LAW ENFORCEMENT ORDINANCES. ORDINANCE NO. 375. (Taiki osen boshio shikorei no ichibu o kaisei suru seirei yoko. Seirei Dai 375-go). Text in Japanese. Kankochō Kogaisenmon Shiryō (Public Nuisance Gaz.), 10(1):95-99, Jan. 1975.

A summary of Government Ordinance No. 375, which amends the Air Pollution Control Regulations Enforcement Order (Ordinance No. 329, 1968), is reproduced. Types of smoke are defined by content of sulfur oxides. Part of Metropolitan Tokyo is to be included as one of the designated pollution regions. The desired atmospheric environmental standards for smoke emission should be attained by March 1978, with due regard given to practical aspects of equipment installation and factory operation. Misprints in Ordinance No. 329 are corrected, and revisions are listed. The jurisdiction of the Dept. of Atmospheric Control is elaborated as a revision of the Order for Establishment of the Environmental Agency (Government Order No. 219, 1971).

51981

APTIC NO. 75086

Office of Air and Waste Management, Research Triangle Park, N. C., Office of Air Quality Planning and Standards

TECHNICAL SUPPORT DOCUMENT - EPA REGULATIONS FOR PREVENTING THE SIGNIFICANT DETERIORATION OF AIR QUALITY (FINAL RE-

LEGAL AND ADMINISTRATIVE

51986

PORT). Program Element 547853A991, Rept. EPA-450/2-75-001, 119p., Jan. 1975. 24 refs.

NTIS: PB 240215/AS

A detailed expansion of the technical and policy considerations which form the basis for the Environmental Protection Agency regulations (total suspended particulates and sulfur dioxide) for preventing the significant deterioration of air quality is presented. Except for fuel conversion plants, the sources covered by the regulations comprise the 18 largest industrial emitters of sulfur dioxide and total suspended particulates. Topics covered include: reasons for selecting a three-class air quality increment plan; reasons for rejecting alternative plans; the selection of air quality increments; air quality monitoring requirements; reasons for the selection of the pollutants and sources covered; the impact of the regulations on general growth and development as well as on power generation and new energy sources; interstate boundary conflicts; best available control technology; the initial qualification of areas and criteria for reclassification; and the effective date for source review and determination of significant deterioration. A number of references cited are included as appendices.

51982

APTIC NO. 75170

Office of Air and Waste Management, Seattle, Wash.,
Regional Office X and TRW, Inc., Redondo Beach, Calif.,
Environmental Services

IMPLEMENTATION PLAN REVIEW FOR OREGON AS
REQUIRED BY THE ENERGY SUPPLY AND ENVIRONMENTAL
COORDINATION ACT. Office of Air and Waste Management Contract 68-02-1385, Rept. EPA-450/3-75-012, 82p., March 1975. 10 refs.

NTIS: PB 241622/AS

An Environmental Protection Agency review of Oregon's implementation plan to determine if revisions can be made to control emissions from stationary fuel combustion sources (total suspended particulates and sulfur dioxide) without interfering with National Ambient Air Quality Standards is presented. Sulfur dioxide emission regulations may be revised in all regions except the Northwest Air Quality Control Region and the Portland Interstate (Oregon portion) region without jeopardizing NAAQS since present fuel burning practices are in significant over-compliance with SO₂ emission regulations. Particulate emission regulations appear to be overly restrictive only in the central AQCR. Clean fuel savings policies which result in permissible increases in SO₂ emissions must be implemented with caution in regions where attainment and maintenance problems exist for particulate ambient air standards since increased particulate emissions can result from the use of higher sulfur fuels. (Author summary modified)

51983

APTIC NO. 75171

Office of Air and Waste Management, Philadelphia, Pa.,
Regional Office III and TRW, Inc., Vienna, Va.,
Environmental Services

IMPLEMENTATION PLAN REVIEW FOR MARYLAND
AS REQUIRED BY THE ENERGY SUPPLY AND ENVIRONMENTAL
COORDINATION ACT (FINAL REPORT). Office of Air and Waste Management Contract 68-02-1385, Rept. EPA-450/3-75-017, 53p., Feb. 1975. 1 ref.

NTIS: PB 241623/AS

An Environmental Protection Agency review of Maryland's implementation plan to determine if revisions can be made to control emissions from stationary fuel combustion sources (total suspended particulates and sulfur dioxide) without interfering with National Ambient Air Quality Standards is presented. Although there is little indication that current emission regulations for total suspended particulates are overly restrictive, current SO₂ emission limits may be revised in some of the Air Quality Control Regions. Ambient levels of SO₂ during 1973 did not violate either the annual or 24-hour Federal standard in any AQCR in contrast to TSP emissions which exceeded Federal standards in all but the Southern

Maryland AQCR. Recommendations are made indicating that regulations might be revised.

51984

APTIC NO. 75172

Office of Air and Waste Management, Denver, Colo.,
Regional Office VIII and TRW, Inc., Redondo Beach,
Calif., Environmental Services

IMPLEMENTATION PLAN REVIEW FOR MONTANA
AS REQUIRED BY THE ENERGY SUPPLY AND ENVIRONMENTAL
COORDINATION ACT. Office of Air and Waste Management Contract 68-02-1385, Rept. EPA-450/3-75-021, 50p., March 1975. 12 refs.

NTIS: PB 242 306/AS

An Environmental Protection Agency review of Montana's implementation plan to determine if revisions can be made to control emissions from stationary fuel combustion sources (total suspended particulates and sulfur dioxide) without interfering with National Ambient Air Quality Standards is presented. Total suspended particulate emission standards do not appear to be overly restrictive even though Montana has slightly more stringent air quality standards than the National Ambient Air Quality Standards. Total suspended particulate violations occurred in all Air Quality Control Regions except Great Falls. There are tolerances for increased SO₂ emissions in the Great Falls and Miles City AQCRs, however. The state's fuel combustion sources are generally in compliance with the state's SO₂ emission regulation. Recommendations are made indicating where regulations might be revised.

51985

APTIC NO. 75173

Office of Air and Waste Management, Dallas, Tex., Regional
Office VI and TRW, Inc., Redondo Beach, Calif.,
Environmental Services

IMPLEMENTATION PLAN REVIEW FOR LOUISIANA
AS REQUIRED BY THE ENERGY SUPPLY AND ENVIRONMENTAL
COORDINATION ACT. Office of Air and Waste Management Contract 68-02-1385, Rept. EPA-450/3-75-024, 52p., Feb. 1975. 12 refs.

NTIS: PB 241624/AS

An Environmental Protection Agency review of Louisiana's implementation plan to determine if revisions can be made to control emissions from stationary fuel combustion sources (total suspended particulates and sulfur dioxide) without interfering with National Ambient Air Quality Standards is presented. Particulate emission regulations do not appear to be overly restrictive since violations of national ambient air quality standards for TSP are occurring in each of the state's Air Quality Control Regions. Although SO₂ concentrations are below NAAQS, it is not possible to determine whether the currently low SO₂ levels are due to an overly restrictive regulation limiting the use of certain fuels or to other factors.

51986

APTIC NO. 75175

Office of Air and Waste Management, Atlanta, Ga., Regional
Office IV and Argonne National Lab., Argonne, Ill., Energy
and Environmental Systems Div.

IMPLEMENTATION PLAN REVIEW FOR NORTH
CAROLINA AS REQUIRED BY THE ENERGY SUPPLY AND ENVIRONMENTAL
COORDINATION ACT. Office of Air and Waste Management Contract EPA-IAG-D5-0463, Rept. EPA-450/3-75-030, 21p., March 1975.

An Environmental Protection Agency review of North Carolina's implementation plan to determine if revisions can be made to control emissions from stationary fuel combustion sources (total suspended particulates and sulfur dioxide) without interfering with National Ambient Air Quality Standards is presented. There is little possibility for particulate emission regulation relaxation since high particulate levels are being measured throughout most of the state. No SO₂ violations of the NAAQS are reported for North Carolina, indicating a significant state-wide capacity to absorb increased SO₂

emissions. Significant clean fuels savings can be realized in all air quality control regions if regulations are relaxed and if higher sulfur fuels become available. Recommendations are made indicating how regulations might be revised.

51987

APTIC NO. 75181

International Business Machines Corp., Gaithersburg, Md.,
Federal Systems Div.

COMPREHENSIVE DATA HANDLING SYSTEM, EMISSIONS INVENTORY/PERMITS AND REGISTRATION SUBSYSTEM (EIS/P AND R): PROGRAM DOCUMENTATION AND USERS GUIDE (FINAL REPORT). Office of Air and Waste Management Contract 68-02-0638, Rept. EPA-450/3-74-045-a, 418p., Feb. 1975.

NTIS: PB 242 161/AS

Documentation for the Emissions Inventory/Permits and Registration Subsystem is presented along with a user's guide for each computer program in the system. The Subsystem provides air pollution control agencies with the capability to create and maintain their own emissions inventory and permit or registration data base and to retrieve data and generate reports from that data base. In addition to the basic system, several preprocessor and postprocessor programs are provided which perform functions necessary to make this system compatible with the Environmental Protection Agency's National Emissions Data System.

51988

APTIC NO. 75182

Office of Air and Waste Management, Research Triangle Park, N. C., Office of Air Quality Planning and Standards and Environmental Protection Agency, Washington, D. C., Office of Enforcement and General Council

STATE AIR POLLUTION IMPLEMENTATION PLAN PROGRESS REPORT, JULY 1 TO DECEMBER 31, 1974. Rept. EPA-450/2-75-003, 102p., April 1975. 28 refs.

NTIS: PB 241494/AS

The status of State Implementation Plans is assessed along with progress that enforcement activities are making in bringing major emitters into compliance. The number of fully approved SIPs dropped from three to zero, partly because the Environmental Protection Agency, in response to court orders, proposed or promulgated regulations for non-significant deterioration, variances and enforcement orders, and public availability of data. The number of major emitters identified is 19,200; 70% of these are now in compliance with an emission standard or an acceptable compliance schedule. Although the goal of attaining ambient air quality standards will probably not be achieved in all air quality control regions by the statutory deadlines, the SIP process is accomplishing reductions in ambient levels of the criteria pollutants on a nationwide basis.

51989

APTIC NO. 75316

Federal Minister of Health (West Germany)

UNIFORM FEDERAL PRACTICE IN MONITORING EMISSIONS FROM PLANTS PURSUANT TO SECTION 16 OF BUSINESS CODE. (Bundeseinheitliche Praxis bei der Ueberwachung der Emissionen aus Anlagen nach 16 der Gewerbeordnung). Gemeinsames Minist. Bundesminist. Inn., no. 25:365-366, 1968. Translated from German. Leo Kanner Associates, Redwood City, Calif., 5p., Feb. 1975.

Guidelines for monitoring dust and sulfur dioxide emissions from steam boiler plants exceeding specified levels are presented. The guidelines refer to minimal requirements for monitoring devices, laboratories designated for qualified testing, the disclosure of qualified measuring equipment, the installation of required monitoring devices, and the maintenance of monitoring equipment. The monitoring installations must include: a dust concentration meter (or smoke density meter for oil-fired facilities), a carbon dioxide meter, a temperature meter, an SO₂ concentration meter, and a data recorder.

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1974

51990

APTIC NO. 75116

Briggs, T. M., M. Overstreet, A. Kothari, and T. W. Devitt

AIR POLLUTION CONSIDERATIONS IN RESIDENTIAL PLANNING. VOLUME II: BACKUP REPORT (FINAL REPORT). PEDCo-Environmental Specialists, Inc., Cincinnati, Ohio, Office of Air and Waste Management Contract 68-02-1089, Rept. EPA-450/3-74-046-b, 112p., July 1974. 95 refs.

NTIS: PB 240 998/AS

The technical basis for air quality estimation procedures used in assessing the environmental impact of residential planning alternatives is presented. The justification for selecting only particulates, sulfur dioxide, and carbon monoxide for assessing air quality is included along with the basis on which air quality criteria levels are determined. A detailed description of a method for converting outdoor pollutant levels to indoor concentrations is also presented. The chief weakness of the procedure for assessing the impact of residential planning on air quality is that many of the relationships employed require further validation to ensure reasonable accuracy. Models for the assessment of emission sources and their impact on residential sites are rather limited in the range of input conditions they can handle.

51991

APTIC NO. 73674

Edwards, H. W.

SUMMARY. In: *Environmental Contamination Caused by Lead (Interim Report)*. Colorado State Univ., Fort Collins, National Science Foundation Grants GI-34813X1 and GI-44423, p. 1-13, Dec. 31, 1974.

The Colorado State University research program dealing with the environmental effects of lead contamination is outlined. Components of the program include: studies of the atmospheric flow of automotive lead using an urban sampling network and mathematical transport models, the use of physical modeling to study the effects of city geometry on lead dispersion, the simulation of short-range transport of lead from highways, studies of ice nucleation characteristics of automotive exhaust in relation to inadvertent weather modifications, the development of analytical methodology for the detection and identification of environmental lead compounds, studies of the atmospheric chemistry of lead, investigations of lead uptake by soils and plants, an examination of the effects of lead on bacteria, and the promotion of information transfer and data utilization in relation to studies of environmental lead.

51992

APTIC NO. 74265

Grad, Frank P., Albert J. Rosenthal, Laurie R. Rockett, James A. Fay, John Heywood, John F. Kain, Gregory K. Ingram, David Harrison, Jr., and Thomas Tietenberg

THE AUTOMOBILE AND THE REGULATION OF ITS IMPACT ON THE ENVIRONMENT. Columbia Univ., New York, School of Law, Massachusetts Inst. of Tech., Cambridge, Dept. of Mechanical Engineering, and Harvard Univ., Cambridge, Mass., Dept. of Economics, National Science Foundation Grant NSF-GI-29965, Rept. NSF-RA-X-74-023, 787p., June 30, 1974. 839 refs.

NTIS: PB-237 232

The regulation of automotive air pollution and other environmental effects are analyzed. Although significant improvements in current pollution control policies are desirable, no major changes in their overall direction are needed. The soundness of the basic policy of a uniform emissions rollback from new vehicles that is embodied in the Clean Air Amendments of 1970 is confirmed. A very substantial rollback is justified for the protection of health. There is little scientific substantiation, except in the case of nitrogen oxides emissions, for any policy that would require a rollback of less than the 90% required by law. The adherence to the original schedule

to meet 90% reduction goal is not essential, but legislative postponement to model year 1980 with relatively high interim standards would contribute adequately to accomplishment of desirable national ambient air quality standards. Postponement would allow orderly development of effective androllable control technology for longer run, i.e., after 1980 when maintenance of low emissions will depend on effectiveness and stability of engine systems and emission control devices that seek to eliminate virtually all pollution. Other pollution problems from automotive sources include noise, water pollution, solid wastes, and crankcase oil disposal. (Author abstract modified)

51993

APTIC NO. 74138

Haager, Karlheinz

THE SAFETY OF THE ELECTRICITY SUPPLY AND ENVIRONMENTAL PROTECTION - IS THERE A CONFLICT OF INTERESTS? (*Sicherheit der Elektrizitätsversorgung und Umweltschutz - ein Zielkonflikt?*) Text in German. *Elektrizitätswirtschaft*, 73(11):283-286, May 27, 1974.

Requirements for air pollution control in the German electrical generation industry are discussed in terms of their effectiveness and feasibility, with particular emphasis on stack gas desulfurization. Flue gas desulfurization requirements for thermal power plants are unfeasible, especially for coal-fired installations in West Germany and result in wastes whose disposal creates additional environmental problems. Sulfur dioxide emissions are not expected to rise considerably and may even decrease due to fuel oil desulfurization methods.

51994

APTIC NO. 75212

Hagevik, George, Daniel Mandelker, and Richard Brail

THE CONTRIBUTION OF URBAN PLANNING TO AIR QUALITY (FINAL REPORT). Rutgers Univ., New Brunswick, N. J., Center for Urban Policy Research, Environmental Protection Agency Contract 68-02-0278, Rept. EPA-450/3-75-038, 477p., Feb. 1974. 122 refs. NITS: PB 241 795/AS

The relationship between urban planning and air quality management is reviewed. Topics covered include: the potential role of land use controls under the Clean Air Act of 1970; an analysis of procedures involved in implementing the Vermont and Maine comprehensive land use statutes; administrative review procedures for relating land use planning to air quality management; the use of buffer zones as a control over air pollution, including the application of eminent domain and zoning powers; selected local controls; the generation and dispersion of industrial and non-industrial emissions; air quality management in California; and the controversy over the non-degradation principle. (Author abstract modified)

51995

APTIC NO. 73717

Jenkins, R. H.

ENVIRONMENTAL POLLUTION: THE TECHNICAL AND PROCEDURAL ASPECTS OF CO-OPERATION BETWEEN INDUSTRY AND THE LOCAL AUTHORITY. Preprint, National Society for Clean Air, Brighton (England), 5p., 1974. (Presented at the National Society for Clean Air, Annual Conference, 41st, Cardiff, Wales, Oct. 14-18, 1974.)

The technical collaboration between industry and local air pollution control authorities is discussed. The activities of liaison committees composed of industry representatives and control authorities illustrate the value of discussing planned future activities and pollution complaints. Joint monitoring activities also aid in preventing air pollution episodes since source and ambient air data can be exchanged and correlated with climatological data.

51996

APTIC NO. 74220

Yamaura, T.

ADVANCE ESTIMATION PROCEDURE ON THE ENVIRONMENTAL INFLUENCES. (*Kankyo eikyo jizen hyoka tetsuzuki ni tsuite*). Text in Japanese. Preprint, Science Council of Japan, p. 26-28, 1974. (Presented at the International Environmental Protection and Scientific Conference, 3rd, Kyoto, Japan, Nov. 1974.)

Japanese pollution control plans are discussed. A 10-year control plan for Tokyo which sets permissible emission levels for total emission control was adopted in 1971. The first pollution control plan in Osaka employed a compounded pollution index. The plan also included standards for licensing new facilities. However, the plan may not be suitable for the advance evaluation of a new facility since it was designed for pollution reduction in a particular area.

51997

APTIC NO. 72393

CONTROL OF AIR POLLUTION. Intern. Digest Health Legislation, 25(4):739-741, 1974. 5 refs.

French Decree Number 74-415 of May 13, 1974 concerning the control of air pollutant emissions from industrial and non-industrial stationary sources and the use of thermal energy is outlined in terms of the repeal of various earlier provisions. The provisions involve the establishment of special protection areas, control stipulations imposed during air pollution episodes, and the establishment of rules applicable to the construction, operation, and inspection of stationary combustion, fuel-burning, or heating installations.

51998

APTIC NO. 72395

ENVIRONMENTAL PROTECTION: ESTABLISHMENT OF A SPECIAL SECRETARIAT FOR THE ENVIRONMENT. Intern. Digest Health Legislation, 25(4):731, 1974. 1 ref.

Provisions of a decree establishing a Special Secretariat for the Environment within Brazil's Ministry of the Interior are outlined. Aside from the establishment of the Special Secretariat, an Advisory Council for the Environment is attached to the Secretariat. The functions of the Secretariat include: the drafting and establishment of environmental standards, the collaboration with specialized agencies in the supervision and enforcement of standards, the promotion of education in environmental protection, and the maintenance of an up-to-date list of pollutants and toxic substances of national significance.

51999

APTIC NO. 72396

CONTROL OF AIR POLLUTION: EMISSIONS FROM MOTOR VEHICLES. Intern. Digest Health Legislation, 25(4):709, 1974. 3 refs.

Amendments to regulations made under Australia's Clean Act of 1961 are outlined. The amended regulations deal with testing procedures for determining the level of emissions from motor vehicles and with motor vehicle emission standards.

52000

APTIC NO. 73805

Himeji Municipal Office (Japan), Bureau of Health and Environment

SUMMARY OF THE ENVIRONMENTAL POLLUTION CONTROL ADMINISTRATION. (*Kogai gyosei no gaiyo*). Text in Japanese. In: *Himeji-shi no Kogai* (Environmental Pollution in Himeji City, p. 4-31, Oct. 1974.

The progress in environmental administration in Hyogo Prefecture particularly in Himeji city since 1958 is outlined chronologically. The organization chart of the environmental

control administration office and list of instruments (type, number of instrument owned by municipal office and date acquired) used for atmospheric, noise and vibration, and water pollution measurement are given in tabular form. The pollution control budgets from 1966 to 1974 are given; they have increased from \$12,390 in 1966 to \$255,600 in 1974. The number of establishments registered in accordance with the Hyogo environmental control regulations, the noise control regulations, water pollution control regulations, and atmospheric pollution control regulations are compiled in tabular form. Data on the number of complaints registered since 1964 are compiled and classified by the type of pollution, type of industry, and geographical area. Statistical data on the handling of pollution control by the type of complaint and monthly variation are also compiled.

52001

APTIC NO. 73823

Kyoto Prefectural Government (Japan), Pollution Control Office

KYOTO AND ENVIRONMENTAL POLLUTION. (*Kyoto to kogai*). Text in Japanese, 239p., June 1, 1974.

The definition of environmental pollution (occurrence of environmental pollution, origin of the term) and pollution problems and control measures for atmospheric, water, soil, noise, vibration, and malodor pollutions and land subsidence (characteristics, future prospects for pollutionless environment, fundamentals, and emergency and preventive control measures) are discussed with some data. The 1974 budget for environmental pollution control is given. The circumstance surrounding the declaration that the driving of private cars for sightseeing in Kyoto is unwelcome is discussed with survey data of sightseeing traffic. The movement for protecting citizens from environmental pollution, concepts of world environment day and environment week, and appeals of the mayor and citizens for protecting the environment are described. The definition of terms related to environmental pollution and Kyoto Prefectural and municipal environmental pollution control regulations are attached.

52002

APTIC NO. 73832

Itami Municipal Office (Japan)

SUMMARY OF THE ENVIRONMENTAL ADMINISTRATION. (*Kogai Gyosei no Gaiyo*). Text in Japanese. In: *Kogai no Gaikyo 49 nenban (General Condition of the Environmental Pollution, 1974)*, p. 1-8, Dec. 1974.

The environmental pollution control administration in Itami city (population 169,873), located in the southeastern part of Hyogo Prefecture, is summarized. The geographical condition of the city, classification of zoning, number of factories by industrial type and chronological progress in environmental pollution control administration since July 1948 are given. The organizational structure of environmental pollution control administration and description of each administrative branch are also given as well as the pollution control procedures and list of pollution related measurement instruments. The statistical data on the number of registered factories in accordance with municipal environmental protection ordinances are also compiled.

52003

APTIC NO. 73833

Itami Municipal Office (Japan)

ENVIRONMENTAL POLLUTION DISPUTES AND ACTUAL SITUATION OF SETTLEMENT. (*Kogai no kujo to shori jokyō*). Text in Japanese. In: *Kogai no Gaikyo (General Condition of the Environmental Pollution)*, p. 9-12, Dec. 1974.

A review of the number of pollution dispute cases, cases settled, and cases still unsettled during the period of 1969 to 1973 shows that they increased steadily until 1972 and showed a decrease in 1973. This decrease is not considered to be an indication of an actual decrease in pollution problems. As for the nature of pollution dispute, noise pollution comprises 32-49%,

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followed by smoke pollution, (15-25%), malodor (7-19%), particulate matters, polluted water, and gaseous pollutants. The number of pollution dispute cases by zoning classification and the status of their settlement are also given.

52004

APTIC NO. 73836

Shizuoka Prefectural Government (Japan)

ENVIRONMENTAL POLLUTION CONTROL PROJECT.

(*Kogai boshi keikaku*). Text in Japanese. In: *49 nenban Kogai Hakusho (Environmental White Paper, 1974)*, p. 335-340, 1973.

The procedure for formulating pollution control plans is discussed. The 5-year pollution control plan for Fuji district (including two cities and four townships) which was put into effect in Dec. 1973 is described. The air pollutant concentration standards are as follows: sulfur oxides, 1-hour value 0.1 ppm and daily average 0.04 ppm; suspended particulates, 1-hour value 0.20 mg/cu m and daily average 0.10 mg/cu m; nitrogen oxides, daily average 0.02 ppm; and hydrogen fluoride, yearly average 0.02 ppm. The present value and target value of water pollution load (biological oxygen demand) for eight rivers and one bay are given. The air pollution control measures to be taken by industries are desulfurization and low sulfur content fuel for SO_x, fuel conversion and electrostatic precipitator for suspended particulates, improvement in combustion methods and denitrification for NO_x and alkali washing for HF. The pollution control measures to be taken by industries and municipalities for water, noise, and malodor pollution are also described. The total budget for the 5-year plan is \$90,000,000 for industries and \$70,000,000 for municipalities.

52005

APTIC NO. 73838

Shizuoka Prefectural Government (Japan)

ENVIRONMENTAL POLLUTION CONTROL MEASURES IN MUNICIPALITIES. (*Shichosen no kogai taisaku*). Text in Japanese. In: *49 nenban Kogai Hakusho (Environmental White Paper, 1974)*, p. 326-334, 1975.

For environmental pollution control at the municipal level the environmental pollution control was established in 15 municipalities and the environmental pollution control committee was established in 43 municipalities in Shizuoka Prefecture. The nature of the environmental pollution agreement between the polluter and municipality is described. Since the municipality has no authority to enforce control standards stricter than the ones regulated by law and ordinance, individual control agreements are made with the polluter for specific pollution problems. Examples of such control agreements are the agreement between D Metal Industrial Co. and seven municipalities in the area made in July 1973, in which itemized control regulations such as the use of closed system for waste water disposal were agreed upon, and the agreement on sulfur dioxide emission made between 131 factories and Fuji city in which the enforcement of 503 plans for attaining an 0.03 ppm level by 1975 is agreed. The list of pollution control administrative branches in municipalities is also given.

52006

APTIC NO. 73899

ON TOTAL AMOUNT REGULATIONS FOR ATMOSPHERIC POLLUTION. (*Taiki osen no soryo kisei ni tsuite*). Text in Japanese. *Taiki Osen Nyusu (Air Pollution News)*, no. 80-81:2-44, Jan.-March 1974. (Presented at the Liaison Committee Meeting, 11th, Tokyo, Japan, Sept. 19, 1973.)

The transcript of the proceedings of an all-day symposium on total amount regulations for air pollution is presented. A panel of experts spoke on various topics. Topics covered included: environmental capacity and total amount regulations; establishment of environmental capacity and application toward total amount regulations; carrying capacity regulations for air pollution; atmospheric pollution analysis for sulfur oxides in the

Yokkaichi Region; atmospheric regulatory plans in Kobe City; how to weight each pollution factor in total amount regulations; what sort of diffusion effects are possible from total amount regulations; problems with environmental capacity; atmospheric pollution and meteorological conditions.

52007

APTIC NO. 73960

California Air Resources Board, Sacramento, Calif., Land Use Planning Program

ASSESSMENT OF AIR QUALITY IMPACT OF TWO SCENARIOS FOR THE DEVELOPMENT OF THE STATE OF CALIFORNIA (STAFF REPORT). *Dept. of Housing and Urban Development Grant CPA 1032.207, CPA-CA-09-39-1032, 43p., Aug. 1974. 7 refs.*

NTIS: PB 237873

The relative air quality impacts of two scenarios based on the California Tomorrow Plan are assessed for 1985 and 2000. The scenario known as California One includes transportation features that are essentially a continuation of existing trends, while the scenario known as California Two is predicated on significantly increased planning efforts. Source categories comprising motor vehicles, aircraft, stationary sources, and other mobile sources are identified; and emission projection parameters based on population are developed for each year and source category. Emission rates for California Two are significantly less than for California One, with motor vehicle pollutants (hydrocarbons, carbon monoxide, and nitrogen oxides) showing the greatest decrease.

52008

APTIC NO. 73961

California Air Resources Board, Sacramento, Calif., Land Use Planning Program

AIR QUALITY - LAND USE CONSIDERATIONS IN ONGOING STATE PLANNING PROCESS (STAFF REPORT). *Dept. of Housing and Urban Development Grant CPA 1032.207, CPA-CA-09-39-1032, 46p., Sept. 1974. 26 refs.*

NTIS: PB 237872

A survey of air quality considerations in land use planning being undertaken by several California state departments and agencies is presented. Agencies surveyed include: the Departments of Transportation, Water Resources, Food and Agriculture, Commerce, General Services, Health, Housing and Community Development, and Parks and Recreation; the State Water Resources Control Board; the Energy Commission; the Office of Planning and Research; the Public Utilities Commission; the Governor's Office; the Coastal Zone Conservation Commission; and the San Francisco Bay Conservation and Development Commission. Federal and state legislative mandates for integration of air quality considerations into land use planning are also reviewed. Present research for the Bay area in particular indicates that filling a substantial part of the Bay (as much as 25%) would cause increased smog and smog-producing temperature inversions.

52009

APTIC NO. 74024

California Air Resources Board, Sacramento, Calif., Land Use Planning Program

AIR QUALITY LAND USE PLANNING PROCESS IN CALIFORNIA - STATUS JUNE 1974 (STAFF REPORT). *Dept. of Housing and Urban Development Grant CPA 1032.207, CPA-CA-09-39-1032, 9p., July 1974.*

NTIS: PB 237865

The status of land use planning processes in the state of California as they relate to air quality is reviewed. Presently there is no mandate from the Legislature on how to conduct a planning process that relates basin air quality to the general plans of local units of government and the regional transportation. The transportation plan, in the absence of another mechanism, becomes a de facto land use plan for California. The need for a regional framework to help evaluate the cumulative

effect of growth and the development on future air pollutants in increasing in the state, and a mechanism for relating projects to future air quality is a first priority item.

52010

APTIC NO. 74076

Kanagawa Prefectural Government (Japan)

LAWS AND ORDINANCES RELATING TO ENVIRONMENTAL POLLUTION. (*Kogai kankei horei*). Text in Japanese. In: 49 nendo Kogai Hakusho (Environmental White Paper in 1974), p. 35-39, Dec. 1974.

The pollution control system is regulated by both the pollution control law and pollution control ordinances. In the case of Kanagawa Prefecture, the pollution control ordinance issued in 1951 preceded the first pollution control law concerning water pollution issued in 1958, and the control ordinances are generally more detailed and geared to specific pollution problems. A description of pollution control laws and ordinances in effect as of Dec. 1973 is given. A description of the major laws issued or revised during 1973, which are the pollution control basic law, air pollution control law, water pollution control law, noise pollution control law, agricultural soil pollution control law, malodor control law, and refuse disposal control law is also given.

52011

APTIC NO. 74090

Kanagawa Prefectural Government (Japan)

PRESENT STATUS AND CONTROL MEASURES FOR OFFENSIVE ODOR. (*Akushu no genjo to taisaku*). Text in Japanese. In: 49 nenban Kogai Hakusho (Environmental White Paper in 1974), p. 292-296, Dec. 1974.

The malodorants regulated by the Malodor Pollution Control Law are ammonia, methyl mercaptan, hydrogen sulfide, methyl sulfide, and trimethylamine; however, many other substances are involved producing complex but generally localized problems of malodor pollution. Major malodor sources are classified into factories, refuse and nightsoil treatment plants, bone-meal plants, slaughterhouses, and animal farms, and the malodor situation and malodorants from each source are discussed. The Malodor Pollution Control Law has been enforced since May 1972 in the area designated, where the emission of malodorant from each emission source is controlled by the specific emission standard. Malodor pollution is also controlled by the Pollution Control Ordinance, in which structural or equipment standards such as the use of deodorization devices for preventing malodorant emission is emphasized. The malodor source control measures by means of the alteration of process, use of closed systems, use of deodorization devices, or use of proper treatment equipment are discussed for each malodor source.

52012

APTIC NO. 74091

Kanagawa Prefectural Government (Japan)

LONG-TERM PROJECT TO PREVENT ENVIRONMENTAL POLLUTION. (*Kogai o boshi suru tame no choki keikaku*). Text in Japanese. In: 49 nendo Kogai Hakusho (Environmental White Paper in 1974), p. 49-64, Dec. 1974.

The environmental pollution control plan for Kanagawa was formulated based on Article 19 of the Pollution Control Basic Law. The basic policy and target date (1981) are stated. The control plan described pertains to air pollution control (sulfur oxides, particulate matter, automotive exhaust gas, toxic substances, and photochemical smog), water pollution control, noise and vibration pollution control, control for land subsidence, malodor pollution control, soil pollution control, and refuse disposal control. Other related control measures, pollution monitoring systems, and a natural environmental protection plan are also discussed. As for the progress in the pollution control plan, 90% was achieved in terms of budget spending in 1972 but only 65% was achieved in 1973. A new over-all pollution control project was formulated in Nov. 1973. The basic plan and preparation plan are discussed in reference to the determination of allowable environmental standards, indus-

52013

trial site-planning, use of closed systems, emission source control measures, environmental pollution monitoring systems, and financial aspects.

52013

APTIC NO. 74112

Osaka Prefecture (Japan)

MAJOR POLICIES ON POLLUTION CONTROL FOR 1974. (*Showa 49-nendo ni oite kojiyo to suru kogai boshi ni kansuru shuyo shisaku*). Text in Japanese. 34p., May 1974.

Pollution control policies for 1974 for Osaka Prefecture, Japan are enumerated. Basic pollution control policies (for air, water, soil, ground settling, noise and vibrations, and aircraft) and their implementation are described. Osaka Prefectural Pollution Control Regulations (1971) were revised and made more stringent under provisions of the National Atmospheric Pollution Control Law and Water Quality Deterioration Control Law. Industrial waste water, dumped into Seto-Naikai (Inland Sea of Japan) from Osaka Prefecture, must meet water quality standards. A center of Environmental Chemistry is to be established for administering a pollution data bank system. A Department of Pollution is to be established within the police department for overseeing pollution-related violations. Measures are described for conservation of the natural environment and maintenance of a healthful environment. Part of the cost of medical treatment (5/6 of medical expenses, including doctor's fees) and administrative work (2/3 of expenses) are borne by the prefectural and national governments in cases of specific pollution-caused ailments for residents of Osaka City, Sakai City, and Toyonaka City; industry pays half of the medical expenses. Governmental loans are available to medium and small-sized enterprises for pollution improvement of plant relocation. Unsecured loans (up to \$11,700 and secured loans (in general, no more than \$66,000) can be obtained for 7-year terms at yearly interest rates of 1-2%. The estimated total of all pollution-related expenditures for 1974 is \$142 million, an increase of \$5 million from 1973 figures.

52014

APTIC NO. 74113

Kyoto City (Japan)

SUMMARY OF POLLUTION COUNTERMEASURES IN KYOTO CITY. (*Kyoto-shi ni okeru kogai taisaku no gaiyo*). Text in Japanese. 43p., Oct. 1974.

The progress of pollution countermeasures in Kyoto, Japan as of 1974 are summarized. The Division of Pollution Countermeasures was established in 1971, and pollution administration has finally become systematized. The anti-pollution budget for 1974 includes: air pollution control, \$314,000; water pollution control \$58,000; monitoring of pollution sources, \$110,000; pollution control loans and subsidies, \$5.8 million; classroom noise control, \$440,000; waste water treatment, \$73,000; malodor elimination, \$151,000; development of pollution control technology, \$77,000 million. Automobile exhaust gases present major pollution problems because of Kyoto's urban nature and tourist attractions. In November 1973, Kyoto announced a policy of no private cars for sightseeing. In June 1974, the major of Kyoto requested enforcement of 1976 nitrogen oxides emission standards on schedule. Kyoto, together with 7 other major cities, formed an investigative committee which had a confrontation with automakers. Since 1971, Kyoto has been involved in a 5-year plan to build a public sewage system. Of 10,170 hectares occupied by the city, 4376 hectares had been connected to a public sewage system by the end of 1973. Excessive noise from the weaving machines for Nishijinori, a traditional Kyoto weave, has comprised 70% of noise complaints. These factories are located in residential areas, and present difficulties in enforcement of noise control. Loans and subsidies to these enterprises to aid noise abatement have been recently allowed. Since 1970, Kyoto has been in the forefront of the fight to ban PCB (polychlorobiphenyl).

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AIR POLLUTION ABSTRACTS, OCTOBER 1975

52015

APTIC NO. 75122

Research Triangle Inst., Research Triangle Park, N. C.

GUIDELINES FOR AIR QUALITY MAINTENANCE PLANNING AND ANALYSIS. VOLUME 5: CASE STUDIES IN PLAN DEVELOPMENT (FINAL REPORT). Office of Air and Waste Management Contract 68-02-1386, Task 9, Rept. EPA-450/3-74-006, 41U-946-9, 157p., Dec. 1974. 7 refs.

Trial Air Quality Maintenance Plans for Baltimore, Denver, San Diego, and St. Louis are presented in digest form. Topics covered under each plan include: intergovernmental cooperation, baseline emission inventories, emission projections, the establishment of baseline air quality, air quality projections, the selection of maintenance strategies, and the legal aspects of air quality maintenance. Emissions are projected for 1975, 1980, and 1985, and consequent air quality is estimated. Strategies for insuring the attainment and maintenance of air quality during the 1975-1985 decade are proposed. (Author abstract modified)

52016

APTIC NO. 75143

Office of Air and Waste Management, Seattle, Wash.,
Regional Office X and TRW, Inc., Redondo Beach, Calif.,
Environmental Services

IMPLEMENTATION PLAN REVIEW FOR WASHINGTON AS REQUIRED BY THE ENERGY SUPPLY AND ENVIRONMENTAL COORDINATION ACT (FINAL REPORT). Office of Air and Waste Management Contract 68-02-1385, Rept. EPA-450/3-74-065, 69p., Dec. 1974. 8 refs.

An Environmental Protection Agency review of Washington State's implementation plan to determine if revisions can be made to control emissions from stationary fuel combustion sources (total suspended particulates and sulfur dioxide) without interfering with National Ambient Air Quality Standards is presented. Sulfur dioxide emission regulations may be revised in all regions except the Puget Sound air quality control region without jeopardizing NAAQS. Present fuel burning practices are in over-compliance with SO₂ emission regulations, and SO₂ emissions can be increased before violating the emission regulations in each of the AQCRs. Particulate emission regulations appear to be overly restrictive in only the Northern Washington AQCR; in the Eastern Washington-Northern Idaho, Portland Interstate, and the Olympic-Northern Washington AQCRs, it is possible that emission regulations are overly restrictive for significant areas within each region. Recommendations are made indicating how regulations might be revised.

52017

APTIC NO. 75144

Office of Air and Waste Management, San Francisco, Calif.,
Regional Office IX and TRW, Inc., Redondo Beach, Calif.,
Environmental Services

IMPLEMENTATION PLAN REVIEW FOR AMERICAN SAMOA AS REQUIRED BY THE ENERGY SUPPLY AND ENVIRONMENTAL COORDINATION ACT. Office of Air and Waste Management Contract 68-02-1385, Rept. EPA-450/3-74-073, 28p., Dec. 1974. 11 refs.

NTIS: PB 241290/AS

An Environmental Protection Agency review of American Samoa's implementation plan to determine if revisions can be made to control emissions from stationary fuel combustion sources (total suspended particulates and sulfur dioxide) without interfering with National Ambient Air Quality Standards is presented. There is no indication that current emission regulations are overly restrictive in the context of Section IV of the Energy Supply and Environmental Coordination Act. Despite the fact that no air quality monitoring data for SO₂ and TSP are available, there are no obvious indications of NAAQS violations because of the limited number of stationary point fuel combustion sources. (Author summary modified)

LEGAL AND ADMINISTRATIVE

52018

APTIC NO. 75148

Office of Air and Waste Management, San Francisco, Calif.,
Regional Office IX and TRW, Inc., Redondo Beach, Calif.,
Environmental Services

IMPLEMENTATION PLAN REVIEW FOR HAWAII AS REQUIRED BY THE ENERGY SUPPLY AND ENVIRONMENTAL COORDINATION ACT (FINAL REPORT). Office of Air and Waste Management Contract 68-02-1385, Rept. EPA-450/3-74-069, 43p., Dec. 1974. 11 refs.

NTIS: PB 241289/AS

An Environmental Protection Agency review of Hawaii's implementation plan to determine if revisions can be made to control emissions from stationary fuel combustion sources (total suspended particulates and sulfur dioxide) without interfering with National Ambient Air Quality Standards is presented. Current TSP and SO₂ emission regulations do not appear to be overly restrictive within the context of Section IV of the Energy Supply and Environmental Coordination Act. Although air quality data collected by EPA and the State of Hawaii show no SO₂ violations of the NAAQS, monitoring results by the Hawaiian Electric Company indicate one case where SO₂ air quality is exceeding the NAAQS. Particulate emissions are a problem in the state, and reported violations of the NAAQS exist.

52019

APTIC NO. 75169

Office of Air and Waste Management, San Francisco, Calif.,
Regional Office IX and TRW, Inc., Redondo Beach, Calif.,
Environmental Services

IMPLEMENTATION PLAN REVIEW FOR ARIZONA AS REQUIRED BY THE ENERGY SUPPLY AND ENVIRONMENTAL COORDINATION ACT (FINAL REPORT). Office of Air and Waste Management Contract 68-02-1385, Rept. EPA-450/3-74-072, 48p., Dec. 1974. 12 refs.

NTIS: PB 241 796/AS

An Environmental Protection Agency review of Arizona's implementation plan to determine if revisions can be made to control emissions from stationary fuel combustion sources (total suspended particulates and sulfur dioxide) without interfering with National Ambient Air Quality Standards is presented. There are no indications that current emission regulations are overly restrictive in the context of Section IV of the Energy Supply and Environmental Coordination Act even though Arizona's annual and 24-hour SO₂ air quality standards are more restrictive than NAAQS. State and EPA regulations appear to be adequate to attain and maintain NAAQS by the required dates despite current SO₂ violations in three Air Quality Control Regions. The majority of SO₂ emissions in the state come from large point sources, while most of Arizona's particulate emissions originate from wind-blown fugitive dust.

52020

APTIC NO. 75180

International Business Machines Corp., Gaithersburg, Md.,
Federal Systems Div.

COMPREHENSIVE DATA HANDLING SYSTEM, AIR QUALITY DATA HANDLING SUBSYSTEM (AQDHS-II) PROGRAM DOCUMENTATION AND USER'S GUIDE (FINAL REPORT). Office of Air and Waste Management Contract 68-02-0638, Program Element 2AH-137, Rept. EPA-450/3-74-045, 276p., July 1974.

NTIS: PB 241 798/AS

Documentation for the computer programs which comprise the Air Quality Data Handling Subsystem (AQDHS-II) of the Comprehensive Data Handling System is presented along with a user's guide for each program. The Air Quality Data Handling Subsystem provides air pollution control agencies with the capability to create and maintain their own air quality data base and to retrieve data and generate reports from that data base. In addition to the basic system, several preprocessor and

postprocessor programs are provided which perform functions necessary to make this system compatible with existing air quality data handling systems.

52021

APTIC NO. 75305

Fives-Cail Babcock Co., La Courneuve (France), Thermal
Equipment Study and Research Center

THERMAL EQUIPMENT STUDY AND RESEARCH CENTER. FIVES-CAIL BABCOCK. TECHNOLOGY DIRECTORATE. (Centre d'études et de recherches pour les matériels thermiques. Fives-Cail Babcock Direction Technique). Preprint, Feb. 1, 1974. Translated from French. Translation Consultants, Ltd., Arlington, Va., 15p.

Activities of the Thermal Equipment Study and Research Center of Fives-Cail Babcock Company are reviewed. The center provides research in areas dealing with the design of boiler and heat transfer systems, the minimization of air pollution from combustion products, and methods for measuring pollutants in the air and other media. Procedures peculiar to the Babcock technique for pseudoliquid layer combustion (the Ignifluid process) are also being developed, with particular application to ashy solid fuels (coals, tailings). The research center possesses the necessary instrumentation for measuring such combustion products as carbon monoxide, carbon dioxide, nitrogen oxides, sulfur dioxide, sulfur trioxide, and hydrogen sulfide.

52022

APTIC NO. 75360

Voorhees (Alan M.) and Associates, Inc., McLean, Va.,
Planning Environment International Div.

DEVELOPMENT OF A TRIAL AIR QUALITY MAINTENANCE PLAN FOR THE ST. LOUIS AQMSA (FINAL REPORT). Office of Air and Waste Management Contract 68-02-1388, Task 5, Rept. EPA-450/3-74-052, 197p., Dec. 1974. 41 refs.

NTIS: PB 241824/AS

Documentation for the development of a Trial Air Quality Maintenance Plan for the St. Louis Air Quality Maintenance Study Area is presented. Preparation of the plan includes the review of existing state implementation plans, analyses and projections of air quality and emission inventories, and the formulation of attainment/maintenance strategies for the control of suspended particulates, sulfur dioxide, carbon monoxide, and photochemical oxidants. Sulfur dioxide standards are expected to be attained and maintained throughout the AQMSA with the exception of isolated hot spots in the vicinity of major point sources. A regionwide maintenance strategy is not required. A transportation control plan is required for the attainment of CO and photochemical oxidant standards. Additional particulate controls are not justifiable until it can be determined whether the existing controls are achieving the expected results. The only additional attainment measures recommended are those directed at expanding the monitoring and surveillance of particulates (Author summary modified)

1973

52023

APTIC NO. 71875

Beery, W. T.

SUMMARY OF FIRST APCA GOVERNMENT AFFAIRS SEMINAR. THE CLEAN AIR ACT. Air Pollution Control Assoc., Pittsburgh, Pa., Proc. First Air Pollution Control Assoc. Gov. Aff. Semin., Clean Air Act, Washington, D. C., 1973, 43p. (April 4.)

A summary of papers dealing with the Clean Air Act and its implications for mobile and stationary sources is presented. Topics covered include: emission standards for mobile sources, state implementation plans and implementation strategies for stationary sources, non-degradation of air quality standards, the meaning of best practical technology, and the effect of the National Environmental Policy Act on air quality problems.

Commins, B. T. and J. McK. Ellison

SUGGESTIONS FOR MONITORING AIR POLLUTION IN DEVELOPING COUNTRIES. *World Meteorological Organization, Geneva (Switzerland) and World Health Organization, Geneva (Switzerland), World Meteorol. Organ./World Health Organ. Tech. Conf. Observ. Meas. Atmos. Pollut., Helsinki, Finland, 1973, p. 143-152, WMO-368. 6 refs. (July 30-Aug. 4, Paper N75 11491.)*

NTIS: N75-11476-540

Suggestions related to air pollutant monitoring in developing countries are presented. The monitoring system for air pollution is best conceived in terms of the probable harmful effects to plants, animals, humans, and materials of a given pollutant within the context of the development envisaged. Monitoring should be aimed at providing an estimate of the harm that the pollutant is capable of doing if it is imposed on the actual existing situation. Areas in which uncontrolled large industrial sources are located are prime candidates for initial monitoring since such sources are relatively few and readily identifiable in terms of the pollutants they emit. Sampling methods should be chosen with respect to the financial resources available and the manpower available to operate and maintain the monitoring equipment.

Funabashi, M.

ON THE PROCLAMATION TO DISALLOW PRIVATE CAR SIGHTSEEING. ((Maika kanko kyoho sengen) ni tsuite). Text in Japanese. In: *Kyoto-shi ni Okeru Kogai Gyosei no Ayumi: Kogai Kankei Koho Shiryosho*, p. 14-17, Nov. 5, 1973.

An explanation is given of the proclamation by Kyoto City on Nov. 5, 1973, to refuse entry to tourist sites by automobiles. The proclamation is a request by the city to the touring public and the Kyoto residents to refrain from using private automobiles to visit sightseeing areas. It was felt that historical Kyoto was on the verge of destruction by pollution, and something drastic had to be done to call attention to the pollution facts of life, especially vehicular pollution. Many alternatives to the use of private cars are still in the planning stages. These include walking tours of Kyoto; dispersal of cars; use of city parking lots by buses rather than cars; networks of bikeways; extension of subways; improvement of traffic patterns and roads; all-day passes for bus and trolley riding; and increased aid to mass transit from the national government.

Junge, Christian

THE REQUIREMENTS OF THE WORLD METEOROLOGICAL ORGANIZATION FOR MEASUREMENTS OF ATMOSPHERIC POLLUTANTS.

World Meteorological Organization, Geneva (Switzerland) and World Health Organization, Geneva (Switzerland), World Meteorol. Organ./World Health Organ. Tech. Conf. Observ. Meas. Atmos. Pollut., Helsinki, Finland, 1973, p. 1-13, WMO-368. (July 30-Aug. 4, Paper N75 11477.)

NTIS: N75-11476-540

Requirements for a World Meteorological Organization global air pollution monitoring program are reviewed. The minimal program for regional air pollution stations includes monitoring of turbidity for total aerosols and rainwater content for sulfates, chlorides, nitrates, ammonium ion, calcium, sodium, magnesium, potassium, heavy metals, conductivity, and pH. The minimum program for baseline air pollution stations requires the above measurements plus monitoring for carbon dioxide. Airborne constituents which should be considered for monitoring at baseline air pollution stations in addition to the above include sulfur dioxide, hydrogen sulfide, nitric oxide, nitrogen dioxide, ammonia, total ozone, total precipitable water, dry fall out, carbon monoxide, methane, nitrous oxide, condensation nuclei concentration, aerosol size distribution, airborne heavy metals, and hydrocarbons.

Pack, D. H., R. Fegley, G. Herbert, D. Hoyt, W. Komhyr, J. Miller, and C. Turner

GEOPHYSICAL MONITORING FOR CLIMATIC CHANGE - THE NOAA PROGRAM. *World Meteorological Organization, Geneva (Switzerland) and World Health Organization, Geneva (Switzerland), World Meteorol. Organ./World Health Organ. Tech. Conf. Observ. Meas. Atmos. Pollut., Helsinki, Finland, 1973, p. 334-345, WMO-368. 6 refs. (July 30-Aug. 4, Paper N75 11510.)*

NTIS: N75-11476-540

The National Oceanic and Atmospheric Administration's program to predict the effects of natural and artificial emissions into the atmosphere on climate is described. The program is divided into two portions: the first is a regional measurement program designed to document climatic changes brought about by land use practice over a radius of few hundred km, and the second program is designed to document the character and trend of global background levels of trace constituents. The primary components monitored are carbon dioxide, ozone, and aerosols, and secondary compounds are carbon monoxide and trichlorofluoromethane (Freon-11). The latter is chosen to provide a measure of global transport since it displays a very long lifetime in the atmosphere.

Dept. of the Environment, Scottish Development Dept. and Welsh Office

ONE HUNDRED NINTH ANNUAL REPORT ON ALKALI, ETC. WORKS 1972. *London, England, 131p., 1973. 12 refs.*

Activities of the Alkali Inspectorate during the year 1972 are reported, with particular emphasis on inspection and enforcement activities relating to chemical and allied industries, the metal industries, and the fuel industries (electrical generation, petroleum refining, and gas and coke works). The total number of visits and inspections during 1972 was 13,112. Complaints against registered works were most numerous against mineral works (97) followed by electricity works (49). Infractions during the year were most numerous among metal recovery operations (27 out of a total of 58). Complaints investigated by the inspectorate against non-registrable works were most numerous against chemicals, boiler plants, and incineration.

Kyoto City (Japan), Dept. of Environmental Pollution Countermeasures

ON THE RESULTS OF FIRST STREET INSPECTION OF AUTOMOBILE EXHAUST EMISSIONS. (Dai-ichi-ji jidosha haishutsu gasu gaito tenken kekka ni tsuite). Text in Japanese. In: *Kyoto-shi ni Okeru Kogai Gyosei no Ayumi: Kogai Kankei Koho Shiryosho*, p. 21-24, Dec. 12, 1973.

As part of the continuing street inspection program for automobile exhaust emissions begun in 1970, street inspections on 1870 vehicles (light cars, freight trucks, passenger cars, other vehicles) were conducted in November 1973, in Kyoto City, Japan. Vehicles were stopped on the street and checked for carbon monoxide emission concentrations, ignition timing adjustments, and whether they had undergone the official 6-month inspection. Warnings and summons were issued to 567 offenders, of whom 4 were arrested. Since the initiation of street inspections in November 1972, the percentage of offenders dropped from 37.8% (1618 vehicles, Nov. 1972) to 30.3% (Nov. 1973). During the same time, violations of the CO emission standard (over 6% emission) dropped from 19.7% to 14.1%. About 30% of the vehicles had not undergone the 6-month inspection, but CO emission violations for both uninspected and inspected vehicles ranged around 30%.

1972

52030

APTIC NO. 73907

Asaki, Kunihiko, Hiroo Izumikawa, Norio Ito, Masataka Hayafuku, Tomoko Nagata, Tomio Hirono, Kinji Nakano, Hiroshi Yamazaki, and Toshio Ohira

REGIONAL REPRESENTABILITY OF SULFUR DIOXIDE CONCENTRATIONS AT THE PERMANENT AIR POLLUTION STATIONS. (Aryusan-gas ni kansuru joji-sokuteiten no chiiki daihyosei ni tsuite. Text in Japanese. Tokyo-to Kogai Kenkyusho Nenpo (Annual Rept. Tokyo Met. Res. Inst. Environ. Prot.), no. 3:11-16, 1972. 3 refs.

In order to determine whether 22 permanent monitoring stations in Tokyo (as of March 1971) are representative of the region, 8-9 temporary monitoring stations were set up around 4 permanent monitoring stations (at the Metropolitan Government Office, Itabashi Ward Office, Kojiya Health Center, and Tokyo-to Laboratories for Medical Sciences) and the concentrations of sulfur dioxide were measured continuously for about 1 mo (electroconductivity method) and their results analyzed. At the permanent monitoring station at the Metropolitan Government Office, representative sites were small in number both in summer and winter even within a 2 km range, and the representative region was discontinuous. This area was located in the center of blocks of big buildings. The heights of the temporary monitoring sites were varied, and the sites seemed to be affected by heating in winter. The permanent monitoring station at the Tokyo-to Laboratories for Medical Sciences was representative for the region except for one site. This area was 15-20 km from a large-scale emission source of sulfur dioxide, and the concentrations were expected to be equal over a large area. The permanent monitoring station at the Itabashi Ward Office was representative for the region. This area showed high concentrations of sulfur dioxide when the wind blew from the south, which showed that the effect of neighboring small scale emission sources was slight, but this area was affected by emission sources from the littoral districts which were 20-25 km away. The permanent monitoring station at the Kojiya Health Center possessed wider regional representativeness in winter than in summer. From this investigation, a slope index number of sulfur dioxide concentrations in the area of the permanent monitoring stations can be derived.

52031

APTIC NO. 73707

Bach, Wilfrid

URBAN CLIMATE, AIR POLLUTION, AND PLANNING.

In: *Urbanization and Environment*. T. R. Detwyler and M. G. Marcus (eds.), Belmont, Calif., Duxburg, 1972, p. 69-96. 27 refs.

Recommendations for urban planning that take into account climatic and air pollution factors are presented. The development of new towns or the redevelopment of existing towns in a manner to minimize air pollution can be achieved by the following practices: meteorological and topographical studies of potential sites for new industrial plants; an evaluation of visibility conditions, meteorological variables, and adjacent land uses prior to establishing airport locations; the location of residential areas on hills and ridges rather than in narrow valleys; the prohibition of automobile traffic in park areas; the segregation of shopping areas from automobile traffic; and the enclosure of expressways and other major roads by earth walls with shrubs to contain and filter air pollution.

52032

APTIC NO. 75238

Stairmand, C. J.

POLLUTION CONTROL - HOW FAR CAN WE GO?

Preprint, National Society for Clean Air, Brighton (England), 23p., 1972. 2 refs. (Presented at the National Society for Clean Air Annual Conference, 39th, Scarborough, England, Oct. 16-20, 1972.)

A rational approach to pollution control (gaseous and particulate) for both industrial and domestic emission sources is proposed. Suggestions set forth include identifying the relationship between pollution emissions (and their control) and costs to the community, determining where the greatest pollution problems lie, assessing the cost-effectiveness of various control strategies, and determining possible side effects of controls so that one problem is not solved at the expense of generating a larger one.

1970

52033

APTIC NO. 74263

Loewenstein, J. C.

DETERMINATION OF THE PHYSICAL CRITERIA NECESSARY FOR SITING AIR POLLUTION MONITORING STATIONS AROUND THE CHAMPAGNE-SUR-OISE THERMAL POWER PLANT. (Determination des criteres physiques necessaires au choix des emplacements de mesure de pollution atmospherique au voisinage de la centrale thermique de Champagne-sur-Oise). Text in French. Electricite de France Division Echanges Atmospheriques, Chatou (France), Rept. HF 041- 70/N 22, 5p., Sept. 1970.

Approximate method for siting air pollution monitoring stations around a thermal power plant is presented. The method which is to yield the smallest possible number of sampling stations necessary for a valid pollution monitoring considers physical elements and local elements, such as special protection zones, and possible interference by other sources situated between the power plant and the sampling station. The physical elements are the expected distribution of the mean instantaneous concentrations and the expected mean distribution of the frequency of the peak concentrations, both as a function of the distance from the emission source and the different wind directions. The present calculations are based on a systematic, five-year monitoring of such factors as the characteristics of the emissions, wind speed and direction, atmospheric pressure and temperature, cloudiness, cloud altitude, and the altitude of the inversion base. The processing of the monitoring materials results in a wind direction distribution at different times of the day, a distribution of the mean instantaneous concentrations, and a frequency distribution of the maximum concentrations indicating also the distance of the site of occurrence from the emission source. With the knowledge of these data, the optimum site will be chosen with respect to local considerations. This method is applicable to distances not greater than 10 km.

SOCIAL ASPECTS

1972

52034

APTIC NO. 73702

Swan, James A.

PUBLIC RESPONSE TO AIR POLLUTION. In: *Environment and the Social Sciences: Perspectives and Applications*. J. F. Wohlwill and D. H. Carson (eds.), Washington, D. C., American Psychological Association, 1972, p. 66-74. 19 refs.

Studies investigating public response to air pollution are reviewed. A common finding from opinion surveys is that few people spontaneously express concern about air pollution, even if they live in areas experiencing high levels of air pollutants. Another common finding among community surveys is that very few people ever register complaints with public officials about air pollution. Higher status persons are more likely to complain about air pollution, and people in those areas that suffer from the worst pollution appear to have the least suc-

cess in mounting public pressure for cleaner air. A generally increased recognition of air pollution is illustrated by the fact that in 1965 an Opinion Research Center study showed that 28% of a national sample considered air pollution as somewhat of a problem, while a similar poll in 1966 found 48% of the sample mentioning air pollution as a problem. A 1970 Harris poll revealed that 70% of the respondents recognized air pollution as a problem.

GENERAL

1975

52035

APTIC NO. 73842

Shizuoka Prefectural Government (Japan)

TREND OF THE ENVIRONMENTAL ISSUES IN JAPAN. (*Wagakuni ni okeru kankyo mondai no doko*). Text in Japanese. In: 49 nenban Kogai Hakusho (Environmental White Paper, 1974), p. 1-11, 1975.

The general trend in environmental pollution in Japan is reviewed. The sulfur oxides, carbon monoxide, and suspended particulate pollution indicate decreasing trends reflecting the effect of various control efforts, while the nitrogen oxides showed a deteriorating trend. The hydrocarbon concentration has been fairly level in recent years; however, the incidence of photochemical smog is increasing. An improving trend is observed in water pollution. The water quality tested at 95 public water areas during the period of 1969-1973 showed that 70% showed improvement or leveling and 30% showed deteriorating trends. The problem of noise and vibration caused by high speed transportation means is becoming acute. The complaint concerning malodor is increasing in recent years, and the problem of land subsidence needs definite control regulations and control measures. The matters of cumulative pollution, the effect of the energy crisis on environmental policy, the increase in refuse, and development and environmental problems are discussed. The trend in pollution problems in Shizuoka Prefecture is also reviewed.

1974

52036

APTIC NO. 73826

Ahsmann, A. J.

ENVIRONMENT AND INDUSTRIALIZATION. A MODEL. (*Milieu en industrialisatie, een model*). Text in Dutch. *Ingenieur*, 86(43):829-832, Oct. 1974. 3 refs.

A model of the environmental impacts of industrialization is presented. Natural nuisances experienced by primitive man have been greatly reduced by industrialization which in its turn produced cultural nuisances, including environmental pollution and urbanization. Further industrial development may benefit the environment, and improve the living conditions of man in a general sense of the word, because technological advancement also creates means of abating environmental impacts. This is demonstrated by a significant reduction of the carbon monoxide contents in the air from 100 ppm measured in New York in 1922, and from 50 ppm as measured in Paris in 1928 to the present levels.

52037

APTIC NO. 67839

Environmental Protection Agency, Research Triangle Park, N. C., Air Pollution Technical Information Center

LEAD AND AIR POLLUTION: A BIBLIOGRAPHY WITH ABSTRACTS (FINAL REPORT). Rept. EPA-450/1-74-001, 445p., Jan. 1974. 1835 refs.

NTIS: PB 235860/AS

An annotated bibliography containing 1835 references and abstracts on lead in relation to air pollution is presented. Catego-

AIR POLLUTION ABSTRACTS, OCTOBER 1975

ries covered by the compilation include emission sources, control methods, measurement methods, air quality measurements, atmospheric interaction, basic science and technology, human health effects, effects on plants and livestock, effects on materials, economic effects, standards and criteria, legal and administrative aspects, social aspects, and general topics. Subject and author indices are provided and refer to the abstracts by category letter and accession number. The author index lists all authors individually, with primary authorship being indicated by an asterisk.

52038

APTIC NO. 73806

Himeji Municipal Office (Japan), Bureau of Health and Environment

SURVEY OF THE AIR POLLUTION. (*Taiki osen chosa*). Text in Japanese. In: Himeji-shi no Kogai (Environmental Pollution in Himeji City), p. 127-135, Oct. 1974.

A compilation of data on air pollution in Himeji city is presented. The total amount of fuel consumption by fuel types from 1965 to 1973 and the amount of consumption by type of industry are tabulated. The environmental standards for sulfur oxides, nitric oxide, nitrogen dioxide, and oxidants are given. Data on daily average and maximum concentrations and monthly average concentrations of SO₂, NO, NO₂, and oxidants were compiled and analyzed in reference to environmental standards. Data on suspended and falling particulate concentrations and analysis results of metallic components of particulates are also given. Meteorological conditions (wind rose and frequency of wind direction) are given. A map of locations of air pollution monitoring stations in Himeji and distribution diagram of SO₂ and falling particulate concentrations are included.

52039

APTIC NO. 73822

Suginami Ward (Japan), Div. of Environment

ENVIRONMENTAL POLLUTION IN SUGINAMI WARD IN 1973. (*Suginami-ku no kogai*). Text in Japanese. In: Suginami-ku Kogai Repoto IX (Report on Environmental Pollution in Suginami Ward IX), 149p., Nov. 1974.

The 1973 compilation of environmental pollution in Suginami ward, Tokyo is presented. The characteristics of pollution in Suginami and its control measures are described in categories of pollution due to automobiles, photochemical smog, industrial, noise, and river pollutions. The environmental pollution control administration, administrative and budgetary plans, organization, and resident participation are discussed. The pollution control guidelines for industries, pollution related complaints, and handling procedures for complaints are given. Data on carbon monoxide, sulfur dioxide, nitric oxide, nitrogen dioxide and suspended particulate concentrations are given along with information on noise pollution due to automobiles and water pollution. As for the photochemical smog, data on oxidant concentration and issuance of photochemical smog warnings are given.

52040

APTIC NO. 73840

Ibaragi Municipal Office (Japan), Div. of Environment

ATMOSPHERIC POLLUTION. (*Taiki osen*). Text in Japanese. In: Ibaragi-shi no kogai no Genjo to Taisaku ni tsuite (Present Condition and its Counterplan for Environmental Pollution in Ibaragi City), p. 17-48, Dec. 1974.

Data on atmospheric pollution in Ibaragi city for 1973 are compiled. The environmental standards concerning atmospheric pollution issued in May 1973 are summarized. Statistical data on fuel consumption and emission quantity of sulfur dioxide in Ibaragi city and surrounding cities in Osaka prefecture from 1969 to 1973 are compiled and classified by fuel type. Data on monthly average, maximum one-hour value, maximum daily average and yearly average SO₂ concentration in fiscal year 1973 are compiled. The yearly average SO₂ was 0.017-0.042 ppm, and 5.2% of the days exceeded the new environmental standard in 1973, showing generally a decreasing trend. As for

GENERAL

meteorological conditions, the frequency of wind direction and wind velocity are tabulated. Data on sulfur oxides, suspended particulates, carbon monoxide, nitric oxide, nitrogen dioxide, hydrocarbons, and oxidant obtained by a mobile monitoring system during the fiscal year 1973 are given (monthly average, maximum one-hour value, and maximum daily average). The number of photochemical smog forecasts and warnings issued, geographical distribution, and communication systems in case of emergency are given. The regulatory guidances based on pollution control laws and ordinances are also outlined.

52041

APTIC NO. 73890

Mie Prefectural Government (Japan), Div. of Environment

PRESENT POLLUTION CONDITIONS AND COUNTER-MEASURES. (*Kogai no genkyo to taisaku*). Text in Japanese. In: *49-Nendo Mie-ken Kankyo Hakusho* (1974 Mie Pref. Environmental White Paper), p. 7-73, Dec. 1974.

Pollution conditions and countermeasures in Mie Prefecture, Japan, are described, with special reference to notorious industrial pollution areas (Yokkaichi, Fujiwara, Kuwana, and Owashi). Data were obtained for meteorological conditions; concentrations of sulfur oxides, nitrogen dioxide, photochemical oxidants, airborne particulates, and precipitated particulates; and damage to plant life, especially trees. Constant monitoring of atmospheric pollution and pollution sources is conducted partly by telemetry. Regulations and procedures for

air pollution alerts are listed. Use of diffusion calculations for long range determination of concentrations of nitrogen oxides is presented.

1973

52042

APTIC NO. 75397

Maier, Dietrich

AN IMPROVED METHOD FOR DETERMINATION OF THE CHEMICAL OXYGEN REQUIREMENT BY POTASSIUM DICHROMATE (COD-METHOD). (*Eine verbesserte Methode zur Bestimmung des chemischen Sauerstoffbedarfs mit Kaliumdichromat (COD-Methode)*). *Wasser/ Abwasser* (Munich), 114(8):366-370, 1973. 14 refs. Translated from German, 14p.

The potassium dichromate method for determining the chemical oxygen demand of various water samples, including sewage, is described. The COD determination is performed in closed flasks under thermostatic conditions, using chromosulfuric acid with a dichromate content corresponding to the impurity of the water under investigation. Mercuric sulfate is added to mask any chloride. A ferroin-indicator solution is used for the final colorimetric determination of COD. The method reduces possibilities of error due to variable temperature conditions and the non-capture of volatile organic substances.

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